1944

Progress through agricultural research Louisiana 1942-1943: annual report.

W G. Taggart

Progress through AGRICULTURAL RESEARCH

UAL REPORT
-43

LOUISIANA

W. G. TAGGART
DIRECTOR
EXPERIMENT STATIONS

Progress through Agricultural Research

LOUISIANA
1942-1943

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ANNUAL REPORT

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AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE, LOUISIANA

W. G. TAGGART, *Director*

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Compiled and Edited by I. L. Forbes from Reports of Heads of Departments and Project Leaders

Year Ended June 30, 1943

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Letter of Transmittal

Baton Rouge, Louisiana
May 25, 1944

GOVERNOR JAMES HOUSTON DAVIS
BATON ROUGE, LOUISIANA

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1943, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states.

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C. and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. TAGGART, *Director*
Louisiana Agricultural Experiment Station

Members of Experiment Station Staff Called to the Colors

★

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Matthias Stelly
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Walter C. Verlander
Martin D. Woodin
William E. Worsham

* Reported killed in airplane crash, January 2, 1944.

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[a]Martha Hollinger, M.S., Associate Nutritionist
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Mrs. Virginia Rice Williams, B.S., Laboratory Technician

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[e]Willie Mae Alexander, B.S., Research Assistant
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[a]S. E. McCraine, M.S., Assistant Animal Husbandman
[b]James R. Rash, Jr., M.S., Assistant Animal Husbandman
[b]F. L. Morrison, B.S., Research Assistant
[f]Austin E. Whipp, B.S., Assistant in Animal Industry
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[h]B. D. Gibbens, M.S., Assistant Agronomist
[d]H. D. Ellzey, Jr., B.S., Assistant Agronomist
[b]Charles C. Cain, M.S., Assistant Agronomist
[e]Charles W. McMichael, M.S., Assistant Agronomist
Fred A. Peevy, B.S., Assistant Agronomist
[e]Robert H. Brupbacher, Jr., B.S., Junior Agronomist
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[g]James F. Percy, B.S., Seed Specialist
[e]W. J. Andrews, B.S., Assistant Seed Specialist
S. P. Landry, Farm Foreman
Silton Curtis, Assistant Farm Foreman

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[f]Cecil Branton, B.S., Assistant Dairyman
[f]John Arthur Prichard, M.S., Assistant Dairyman
[e]Joan Marie Bahm, B.S., Assistant in Dairy Nutrition

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[f]C. O. Eddy, Ph.D., Entomologist; Head of Entomology Research Department
[e]C. Egan Smith, M.S., Entomoligst; Head of Entomology Research Department
Alvin L. Dugas, M.S., Associate Entomologist
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Thomas P. Dutsch, M.S., Assistant Entomologist
[b]E. H. Floyd, M.S., Assistant Entomologist

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Jesse L. Farr, M.S., Assistant Chemist
[k]J. H. Jolly, B.S., Assistant Chemist
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Frances L. Bonner, M.S., Feed Analyst

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Clarence W. DuBois, B.S., Food Preservationist; Head of Food Preservation Department
[e]Dorothy L. Colvin, M.S., Research Assistant in Food Preservation

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[b]A. D. Folweiler, Ph. D., Associate Forester
[f]Henry J. Vaux, M.S., Associate Forester

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[a]Francis Kukachka, Ph.D., Assistant Forester
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[f]Santiago Porcella III, B.S., Assistant Forester
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[f]G. Eugene Tower, B.S.F., Assistant Forester
[b]C. H. Vaux, M.F., Assistant Forester

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[b]Fred C. Cochran, M.S., Assistant Horticulturist
M. B. Hughes, Ph.D., Assistant Horticulturist
James E. Welch, M.S., Assistant Horticulturist
Douglas Harper, Farm Foreman

Plant Pathology

[a]Claude W. Edgerton, Ph.D., Plant Pathologist; Head of Plant Pathology Research Department
[a]I. L. Forbes, Ph.D., Plant Pathologist and Assistant Director of Experiment Stations
A. G. Plakidas, Ph.D., Plant Pathologist
[a]St. J. P. Chilton, Ph.D., Associate Plant Pathologist
L. H. Person, Ph.D., Associate Plant Pathologist
E. C. Tims, Ph.D., Associate Plant Pathologist
P. J. Mills, M.S., Assistant Plant Pathologist
[b]T. C. Ryker, Ph.D., Assistant Plant Pathologist
Preston H. Dunckelman, M.S., Assistant Sugarcane Investigator
[b]William J. Luke, Jr., M.S., Assistant Sugarcane Technologist

Poultry Research

[a]Charles W. Upp, Ph.D., Poultry Husbandman; Head of Poultry Research Department
[b]Thomas G. Culton, M.S., Assistant Poultry Husbandman
[a]O. E. Goff, M.S., Assistant Poultry Husbandman
[f]Harry E. Hathaway, M.S., Assistant Poultry Husbandman
Benjamin A. Tower, M.S., Assistant Poultry Husbandman
[b]Gilbert A. Nagel, M.S., Manager of Poultry Breeding Project
[f]Maxwell L. Laing, Manager Poultry Breeding Project
J. R. Austin, Farm Foreman

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[a]T. Lynn Smith, Ph.D., Rural Sociologist; Head of Rural Sociology Department
[g]Harold Hoffsommer, Ph.D., Rural Sociologist
[f]Homer H. Hitt, Ph.D., Assistant Rural Sociologist
[a]Roy E. Hyde, Ph.D., Assistant Rural Sociologist
[f]Bardin H. Nelson, M.S., Research Associate
Louise Kemp, B.S., Research Assistant

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E. C. Simon, M.S., Associate Agronomist
[j]Sam Harrell Smith, M.S., Assistant Agronomist
[f]D. J. DeArensbourg, Farm Foreman
[e]F. W. Berthelot, Jr., Farm Foreman

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[a]A. H. Groth, D.V.M., Associate Veterinarian and Head of Department
[a,e]Paul L. Piercy, D.V.M., Associate Veterinarian
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[b]W. C. Schofield, D.V.M., Assistant Veterinarian
[f]Melvin J. Swenson, D.V.M., Assistant Veterinarian
[e]Eva Sedonia Stanford, M.S., Research Assistant in Veterinary Science

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[e]J. L. Heath, Jr., B.S., Assistant Animal Husbandman
John A. Baker, Farm Foreman

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[b]John A. Hendrix, M.S., Assistant Agronomist
William Oehmig, B.S., Assistant Agronomist
Dudley Moore, Farm Foreman

Rice Station, Crowley

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N. E. Jodon, M.S., Assistant Agronomist, U.S.D.A.
W. A. Douglas, M.S., Assistant Entomologist, U.S.D.A.

United States Department of Agriculture

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E. L. LeClerg, Ph.D., Pathologist
Warren Whitcomb, Jr., Ph.D., Apiculturist in Charge
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Hugo Stoneberg, M.S., Associate Agronomist
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P. K. Harrison, M.S., Assistant Entomologist
Otto Mackensen, Ph.D., Assistant Apiculturist
[c]W. C. Roberts, M.S., Assistant Apiculturist, Agent

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[a] Part-time teaching
[b] On military leave
[c] Transferred
[d] Resigned for military service
[e] Appointed after July 1, 1942
[f] Resigned
[g] On leave of absence
[h] On military leave; reported killed in airplane crash, January 2, 1944
[j] Transferred as Superintendent Southeast Louisiana Livestock Experiment Station, February 1, 1944
[k] Deceased, April 8, 1944

Agricultural Chemistry and Biochemistry

Nutrition Research Division

* * *

Further Studies on Vitamin B-Complex Content of Rice and Milled Products . . . E. A. Fieger and Virginia R. Williams

The study of rice varieties and milled fractions for distribution of B-complex vitamins has been continued, samples having been analyzed for riboflavin, inositol, and biotin. No significant differences were demonstrated in the vitamin content of the several varieties; the vitamin content of the rice decreased with increased milling as was shown by the earlier work on other vitamins of the B-complex. Riboflavin in terms of micrograms per gram of sample for brown rice, milled rice, rice bran, and rice polish, was as follows, respectively: 0.612, 0.270, 2.14, and 1.78. Generally speaking, rice polish and bran, ordinarily potent sources of B-vitamins, do not rank high in riboflavin content when compared with other cereals. On the other hand, brown rice, rice bran and polish are rich sources of biotin and inositol and contain respectively, 0.121, 0.468, 0.656 micrograms of biotin per gram of sample and 3,692, 3,874, and 4,095 micrograms of inositol per gram of sample.

The Influence of Ingredients on the Thiamine Content of Biscuits . . . Virginia R. Williams and E. A. Fieger

The thiamin content of biscuits was studied with reference to the influence of (1) the inclusion or omission of shortening (2) the use of enriched flour as compared with natural high-vitamin flour and (3) the choice of leavening agent. A method of sampling the moist biscuit was developed to avoid losses in thiamin content apparently due to oven drying. Samples prepared by the new method exceeded dried samples by 7.72 per cent in thiamin content, and a saving of 18-24 hours was effected in time required to prepare a sample.

No significant differences could be demonstrated in the thiamin content of shortened and unshortened biscuits. The addition of steapsin to samples in the extraction process, however, effected an increase of at least 5 per cent in the thiamin assay value of both shortened and unshortened samples, after a correction had been made for the thiamin

content of the steapsin. In addition to a higher assay value obtained by use of the steapsin, the extracts obtained after the digestion process were clearer, filtered more rapidly, and left a smaller residue than did those from samples hydrolyzed with diastase alone.

The per cent retention of thiamin in enriched flour biscuits was equal to that in the rice polish-enriched flour biscuits, indicating thereby that the source of the thiamin had no influence on the degree of retention.

Enriched flour and rice polish-enriched flour biscuits made with four different leavening agents ranked in the same order when arranged according to decreasing thiamin content and increasing pH. Arranged thus, they rank: soda lactic acid, cream of tartar baking powder, calcium acid phosphate baking powder, and sodium aluminum sulfate-calcium acid phosphate baking powder.

A Study of the Ascorbic Acid Content of Okra . . .

Dorothy Colvin and Martha E. Hollinger

The ascorbic acid content of okra (Hibiscus exculentes) has been investigated in relation to its variation due to storage, cooking, maturity, and variety. Louisiana Green Velvet and Louisiana White Velvet were selected for more complete study. Pods five to five and one-half inches long varied greatly in ascorbic acid content through the growing seasons from June to November. The values for Louisiana Green Velvet ranged from 15 to 27 milligrams of ascorbic acid per 100 grams. Louisiana White Velvet okra pods of the same size varied in ascorbic acid value from 25 to 38 milligrams per 100 grams. *Storage.* When 5 to 5½ inch pods of Louisiana Green Velvet okra were stored at refrigerator temperature 82 per cent of the ascorbic acid was retained after 24 hours storage and 70 per cent after 48 hours storage. Those stored at room temperature had lost approximately half of their ascorbic acid at the end of 24 hours. *Cooking.* Cooking losses of ascorbic acid in the 5 to 5½ inch pods varied from 18 to 55 per cent depending on the method of cooking. Pods cooked in the pressure saucepan retained the greatest amount of ascorbic acid, 82 per cent. Those cooked with dry heat 5 minutes and moist heat 15 minutes retained the smallest amount of ascorbic acid, 45 per cent. *Maturity.* The ascorbic acid value of Louisiana Green Velvet okra decreased consistently with increasing size of pods. Samples from 5 to 5½ inch pods contained 40 per cent less than those from 2½ to 3 inch pods. *Varieties.* Sixteen varieties of okra were obtained from the Louisiana Fruit and Truck Experiment Station at Hammond. The ascorbic acid content was found to vary from 18 to 53 milligrams of ascorbic acid per 100 grams. Generally speaking, the short pod varieties contained the larger amount of ascorbic acid. The variations in the ascorbic acid value in the 5 to 5½ inch pods from the two varieties studied more thoroughly and the differences found due to stage of maturity render these varietal differences of doubtful significance.

A Study of the Vitamin A and Carotene Content of Milk

E. A. Fieger and Harvye Lewis

The vitamin A and carotene content of milk and butter is being studied on samples obtained monthly. The milk samples are being obtained from 25 dairy farmers located in the several sections of the state where dairying has been developed and represents producers who are using various types of pastures and feedstuffs, and from seven creameries located in the seven largest cities of the state. Samples of butter are being received from two butter producers. This research was undertaken in October, 1943. The results obtained may be briefly summarized as follows: There was a very marked decrease in the vitamin A and carotene content of all milk and butter produced in November in comparison with that produced in October; for December milk and butter where the cows had no supplementary pasture the values were slightly lower than those of November. When, however, supplemental pastures of oats were used the vitamin A and carotene content increased approximately 60 per cent.

The average of vitamin A and carotene content of milk and butter expressed in International Units were as follows:

	Dairy Farm Milk International Units per quart	Creamery Milk International Units per quart	Creamery Butter International Units per pound
October	1,987	1,636	15,480
November	1,358	1,077	9,671
December—(No supplemental pasture)	1,209	1,014	10,238
December—(Supplemental oat pasture)	2,040	.....	.....
January—(No supplemental pasture)	1,171	1,041	8,077
January—(Supplemental oat pasture)	2,075	.....	.....

A Study of the Vitamin Content of Tomatoes Ripened and Stored Under Varying Conditions

Tomatoes from the June and October crops were tested for ascorbic acid, thiamine, and riboflavin content when green, pink ripe and fully ripe. With the spring crop, green and pink ripe samples were ripened in the laboratory and in the sun, and analyzed when ripe; the green and pink ripe fall samples were ripened in the laboratory. The Marglobe, Gulf State Market and Rutgers varieties were used in the spring crop and Marglobe, Rutgers, Louisiana Gulf State and Louisiana Dixie in the fall.

Ascorbic Acid . . . Martha E. Hollinger

In June, samples of three varieties which had ripened in the field had average ascorbic acid values the same as samples of the same varieties when picked slightly pink. At this time green samples averaged slightly higher than those fully ripened in the field. Samples lost 27 per cent of their ascorbic acid value when cooked 10 minutes, and 40 per cent when cooked two hours. Samples picked when slightly pink and ripened at room temperature had ascorbic acid values 10 per cent higher than that of field ripened samples, and also 10 per cent higher than slightly pink samples which were analyzed immediately after picking. Samples which were picked green and ripened at room temperature had lower ascorbic acid values than the freshly picked green tomatoes. All picked samples ripened in the sun had ascorbic acid values lower than freshly picked samples. This was probably due to the fact that the weather was very hot at the time of ripening and the tomatoes ripened in the sun were of inferior quality. In the fall, field ripened tomatoes again were consistently higher than the same varieties which were picked green and analyzed immediately. Tomatoes picked when slightly pink and ripened at room temperature were only a little lower in ascorbic acid than field ripened tomatoes of the same varieties. The Gulf State Market variety in the spring and Louisiana Gulf State variety in the fall, had ascorbic acid values 20 per cent lower than that of the Marglobe. The Rutgers variety had approximately the same value as the Marglobe in the spring. The Louisiana Dixie had a slightly higher value than the Marglobe in the fall.

Thiamine and Riboflavin . . .

Virginia R. Williams and Harvye Lewis

There was no significant difference in the thiamine or riboflavin content of these different varieties in either the spring or fall samples. In the spring samples the thiamine and riboflavin content did not vary with the degree of maturity since vine ripe, pink ripe and green tomatoes contained similar amounts of these vitamins. With the fall samples, however, the thiamine content was considerably less in the green tomatoes when compared to the amount in the ripe tomatoes, while riboflavin content was only slightly lower. When the pink ripe and green tomatoes were ripened in the laboratory there was a decrease in the thiamine content averaging 20 per cent for the spring samples; for the fall samples a similar loss occurred during ripening of the pink ripe samples and a small increase for the green samples. When the pink ripe and green tomatoes were ripened in the sun slight losses of these two vitamins occurred. Losses of these vitamins on cooking for 10 minutes or for 2 hours ranged between 5 and 15 per cent and these losses can be considered

insignificant. Tomatoes are poor sources of thiamine and riboflavin, four ounces or an average serving supplying one-thirtieth of the daily requirements of the former and one-sixtieth of the latter.

The Enrichment of Milled or Polished Rice . . .

E. A. Fieger and Virginia R. Williams

The synthesis of certain of the vitamins has resulted in the manufacture of large quantities of these substances at a very low cost. This has stimulated the addition of synthetic vitamins to certain foodstuffs which have had a large amount of their natural vitamins removed through processing of the food.

Since polished rice has been shown to contain approximately one-fourth as much of the B-complex vitamins as brown rice and that this loss cannot be greatly reduced by undermilling, a study was undertaken to develop a method of adding synthetic vitamins to the milled rice.

Two factors which must be overcome in any successful process for enriching rice are, (1) checking, cracking, and breaking of the rice grains through use of aqueous solutions containing the B vitamins and (2) the loss of vitamins through rinsing or washing prior to cooking. The first difficulty, namely checking, cracking, and breaking of the rice grains, was prevented by using vitamin solutions so constituted as to retard the rate of imbibition of the rice grains. The second difficulty, loss of vitamins on rinsing or washing, was prevented by enveloping the grains with an adherent film. By varying the concentration of the synthetic vitamins in the enriching solution, enriched rice can be prepared containing various amounts of the water soluble vitamins. A concentrated rice so prepared is diluted with ordinary rice to the potency of brown rice.

The enriched rice loses not more than 7 per cent of its vitamin content upon rinsing before cooking. It should be cooked in a small amount of water and allowed to steam until all the water is absorbed so that the vitamins will not be lost in the cooking liquid. Properly cooked, the enriched rice will be tender, fluffy, white, with each grain standing separately, and still retain practically all of its original vitamin content.

Agricultural Economics

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Farm Management . . . J. N. Efferson

Milk Production Costs on Farms During Wartime

The cost of producing milk in the Kentwood area of Southeastern Louisiana averaged $2.18 per hundred pounds in 1938, $2.91 in February, 1942, $3.55 in January, 1943, and $4.21 in August, 1943 (see Table 1). Costs increased steadily from 1941 to 1943 and at an even more rapid rate during 1943. The most important factors causing this increase in expenses for milk production were the increased prices for dairy feeds and the higher cost of farm labor. From January to August, 1943, the price of cottonseed meal increased from $2.20 per hundred pounds to $2.75; soybean meal from $2.50 to $3.15; and corn meal from $2.50 to $2.95. These feeds are the ones most commonly used by the dairymen in this area.

TABLE 1. Costs For Producing 100 Pounds of Milk in the Southeastern Louisiana Dairy Area

Cost Items	Average cost of milk per hundred pounds			
	1937-1938	Feb., 1942	Jan., 1943	Aug., 1943
	Dollars	*Dollars*	*Dollars*	*Dollars*
Concentrate feeds	0.88	1.31	1.37	1.65
Roughage feeds	0.36	0.50	0.55	0.70
Pastured Crops	0.01	0.01	0.02	0.02
Man labor	0.47	0.56	0.88	1.10
Horse work	0.01	0.01	0.02	0.02
Use of farm buildings	0.04	0.05	0.07	0.07
Use of equipment	0.05	0.05	0.07	0.07
Use of land in pasture	0.05	0.05	0.07	0.07
Interest on investment in cows	0.09	0.13	0.14	0.15
Milk hauling	0.10	0.11	0.18	0.18
Power equipment costs	0.05	0.05	0.08	0.08
Other miscellaneous costs	0.07	0.08	0.10	0.10
Total expenses	2.18	2.91	3.55	4.21

The price received by farmers for milk in this area has not increased as rapidly as costs. Unless milk prices rise or feed prices decline, the area can not be expected to maintain the present volume of milk production. For further details see an article in the January, 1943, issue of the Louisiana Rural Economist entitled "Changes in the Cost of Producing Milk in the New Orleans Milkshed," by J. Norman Efferson.

Producer-distributor dairymen in the New Orleans region in 1939 had higher costs of milk production than did dairy farmers in the Kentwood region of Southeastern Louisiana but made greater profits per unit and per farm because the higher prices received in the area near New Orleans more than offset the increased costs. For further details, see Mimeographed Circular Number 36 of the Department of Agricultural Economics, Louisiana Agricultural Experiment Station, entitled "An Economic Study of Producer-distributor Dairy Farms in the Vicinity of New Orleans, La.," by Frank Merrick and J. Norman Efferson.

Family-size Sugar Cane Farms

Detailed records of expenses and receipts from 500 family-sized sugar cane farms in Louisiana were obtained for the 1938 crop year, 453 in 1940, and 467 in 1942. The cost of growing, harvesting, and marketing a ton of sugar cane on the farms studied, not including a charge for the value of the operator's labor, averaged $3.78 per tons in 1938, $5.05 in 1940, and $4.38 in 1942. The difference in cost from 1938 to 1940 was due mainly to variations in average yields obtained. The increased cost of 1942 as compared to 1938 was due not to changes in yield but to higher prices paid for input items under war-time conditions.

Returns from sugar cane averaged about $3.70 per ton in 1938 and 1940 and $5.24 in 1942.. The net return to the average operator for his labor amounted to a loss of $2 per acre in 1938, a loss of $18 per acre in 1940, and a gain of $15 per acre in 1942 (Table 2.). In 1942, the producers had a combination of fairly good yields and a favorable price relative to production expenses. Indications were that net returns in 1943 would be somewhat lower than in 1942.

TABLE 2. Costs and Returns Per Acre and Per Ton of Sugar Cane on Small Farms, Louisiana Sugar Cane Area, 1938, 1940, and 1942

	1938	1940	1942
	Dollars	*Dollars*	*Dollars*
Costs and returns per acre:			
Total returns per acre	75.00	47.00	91.00
Net cost per acre not including the value of the operator's labor	77.00	65.00	76.00
Net returns per acre to the operator for his labor	−02.00	−18.00	15.00
Costs and returns per ton:			
Total returns per ton	3.68	3.70	5.24
Net cost per ton not including the value of the operator's labor	3.78	5.05	4.38
Net returns per ton to the operator for his labor	− 0.10	− 1.75	0.86

Sorghum for Industrial Alcohol

In February, 1942, the Secretary of Agriculture requested the cooperation of Louisiana sugar cane growers and processors in connection with a plan to grow 10,000 acres of sorghum for conversion into syrup for

use in making industrial alcohol. In response to this request, approximately 7,200 acres of sorghum were planted in the area surrounding three sugar cane mills in Lafayette, Iberia, and St. Mary parishes. The processing plants contracted to pay individual producers $4.00 a ton at the farm. The sugar mill operators were allowed $.50 per ton for transportation from the farm to the mill and $1.00 per ton for grinding and converting the sorghum into molasses for use in making industrial alcohol.

An economic study based on data collected from 67 farmers producing 4,597 tons of sorghum on 693 planted acres in 1942 indicates that total costs on the sorghum enterprise averaged $3.41 per ton. With a gross return of $4.00 per ton, the growers studied made an average profit of $4.00 per acre, $.59 per ton, or $0.35 for each hour of labor used on the enterprise (Table 3). One-third of the farmers surveyed had average yields of less than 5 tons per acre and average costs of more than $6.00 a ton. In general, the producers making yields of 6 tons or more broke even and those with higher yields made a profit on the enterprise. The processors who handled the crop in 1942, however, reported that they made little or no profit on the sorghum operation.

The United States Department of Agriculture dropped the sorghum for industrial alcohol experiment in Louisiana after 1942. The principal reason given was that "competition in land use limits the potential use of sorghum to a relatively subordinate position as a source of alcohol—since the greater part of any expansion in sorghum acreage would necessarily have to be made at the expense of corn—."

TABLE 3. Cost and Returns on the Sorghum Enterprise in the Louisiana Sugar Cane Area in 1942*

Item	Unit	Amount per acre	Cost or return per acre	Cost or return per ton
			Dollars	*Dollars*
Costs:				
Seed	pounds	7	$0.69	$ .10
Fertilizer	pounds	100	1.90	.29
Man labor	hours	37	9.20	1.39
Horsework	hours	16	2.08	.31
Tractor use	hours	5	3.08	.47
Equipment use	.....	....	1.48	.22
Land costs	acre	1	4.18	.63
Total costs	.....	....	22.61	3.41
Total returns	tons	6.6	26.54	4.00
Net profits	.....	....	3.93	.59

*Summarized from data collected from 67 farmers producing 4597 tons of Sorghum for industrial alcohol from 693 acres of sorghum.

For further details see an article in the September, 1943, issue of the *Louisiana Rural Economist* entitled "Farmer Experience with the

Production of Sorghum for Industrial Alcohol in 1942," by J. Norman Efferson.

Statistics and Prices . . .

J. P. Montgomery, H. H. Shutz, and Miles McPeek

Farm Prices in Louisiana

Growing out of wartime restrictions on prices, there is an insistent demand for information on past and current prices received by farmers for the various products grown in Louisiana. Current data are published in the *Louisiana Rural Economist*. During 1943, Mimeographed Circular No. 33 was issued as a permanent record of farm prices in Louisiana for the period 1934 through 1942. This circular shows the monthly and average annual prices received for sixteen major agricultural commodities for each of the type-of-farming areas. The price data are compiled from monthly data reported by cooperating farmers in Louisiana.

Although farm prices in Louisiana had made considerable recovery by 1938-39 from the drastic depression of the early 1930's, they had not risen to the level of the pre-depression years 1925-29. (See Table 1 for details). After the outbreak of the present war, the need for farm products stimulated higher prices, but farm prices for many products did not reach the level existing before the depression until 1943. In 1918-19, the average price of cotton was 28.6 cents per pound as compared with only 20 cents in 1943; the average price of sugarcane was $7.12 in 1918-19 as compared with $4.25 in 1943. Rice in 1943 was about 9 cents per bushel under 1918-19 prices. Many farm products are still below the price received during the last war. Important commodity comparisons may be found by referring to the data in Table 1.

Beef Cattle - Corn Price Ratio

One hundred pounds of live weight beef cattle in Louisiana was equal in value to 9.9 bushels of corn in January, 1943. This ratio remained fairly stable during the first six months of 1943. Beginning with July and continuing throughout the last six months of the year a material decline in the ratio occurred. By December 15, 1943, one hundred pounds of live beef was the equivalent in value of only 6.5 bushels of corn.

Hog-Corn Price Ratio

On a basis of Louisiana farm prices for hogs and corn, one hundred pounds of live weight hog was of the same value as 12.5 bushels of corn in January, 1943. By December, 1943, one hundred pounds of hog was equivalent in value to only 8.1 bushels of corn, indicating that prices were less favorable for feeding corn to hogs later in the year.

TABLE 1. PRICES RECEIVED BY LOUISIANA FARMERS DURING THE PRESENT WAR AS COMPARED WITH OTHER SELECTED PERIODS[1]

COMMODITY	Unit	AVERAGE FOR THE PERIOD							
		1918-19	1925-29	1938-39	1939-40	1940-41	1941-42	1942-43	1943†
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
MEAT ANIMALS									
Beef cattle	cwt.	7.80	5.68	4.92	5.41	6.06	7.83	9.80	9.47
Veal calves	cwt.	8.52	7.32	6.22	6.71	7.54	9.89	11.73	12.12
Hogs	cwt.	13.66	8.58	5.67	4.72	5.66	8.56	12.20	12.38
Sheep	cwt.	8.06	6.21	3.44	3.98	3.99	4.85	5.99	6.12
Lambs	cwt.	9.96	8.04	5.32	5.58	5.55	6.36	7.80	8.47
Chickens	lb.	.22	.23	.15	.15	.16	.20	.26	.28
LIVESTOCK PRODUCTS									
Butter	lb.	.47	.43	.27	.26	.28	.33	.41	.45
Butterfat	lb.	.50	.40	.21	.23	.27	.32	.38	.41
Milk, wholesale	cwt.	4.24	2.75	2.04	2.20	2.32	2.72	3.34	3.62
Milk, retail	qt.	.13	.13	.10	.10	.10	.11	.12	.13
Eggs	doz.	.36	.30	.19	.19	.20	.29	.34	.38
Wool	lb.	.42	.33	.21	.24	.30	.35	.41	.41
FEED CROPS									
Corn	bu.	1.72	1.04	.56	.66	.68	.85	1.04	1.19
Oats	bu.	1.00	.67	.38	.46	.42	.54	.68	.84
All hay, loose	ton	21.84	15.55	9.13	9.40	8.88	9.86	12.18	14.10
COTTON									
Cotton lint	lb.	.28	.18	.08	.09	.10	.18	.19	.20
Cotton seed	ton	62.54	30.78	22.12	22.89	24.79	47.24	45.45	48.20
TRUCK CROPS									
Irish potatoes	bu.	1.68	1.66	.87	.96	.81	1.21	1.45	1.68
Sweet potatoes	bu	1.55	1.34	.67	.68	.81	.76	1.57	1.89
MISCELLANEOUS									
Strawberries	crate	5.83	2.94	1.95	1.87	1.98	1.86	4.15	4.15
Sugarcane	ton	7.12	4.60	2.85	2.74	2.79	3.46	3.92	4.25
Rice	bu	1.89	1.16	.64	.73	.93	1.48	1.72	1.89
Cowpeas	bu.	2.93	2.97	1.44	1.36	1.43	1.82	2.27	2.55
Milk cows	head	70.00	43.33	36.83	39.25	42.00	56.00	76.00	84.00
Horses	head	123.00	59.63	65.16	67.16	63.50	67.00	77.00	82.00
Mules	head	140.00	90.99	103.37	105.33	99.25	105.00	113.00	122.00

*The crop-year is from August through the following July.

†Prices in this column are for the 1943 calendar year.

TABLE 2. Beef Cattle-Corn Price Ratio in Louisiana, 1939-43

Year	Month											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average 1925-29	5.4	5.4	5.6	5.6	5.4	5.6	5.1	4.8	5.1	5.7	5.7	5.8
1939	9.8	9.8	9.8	9.3	9.3	8.1	7.8	8.5	9.0	8.8	8.8	8.1
1940	8.3	7.8	7.6	8.0	7.9	7.7	7.9	7.0	8.9	9.3	8.8	8.7
1941	8.9	9.1	9.0	9.1	9.3	9.3	9.7	9.5	9.6	9.6	9.2	9.3
1942	9.2	9.3	9.2	9.3	8.9	9.1	8.5	8.7	9.1	9.4	9.2	9.1
1943	9.9	9.8	9.9	10.1	9.5	9.5	8.5	8.4	8.0	7.5	7.0	6.5

TABLE 3. Hog-Corn Price Ratio in Louisiana, 1939-43

Year	Month											
	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average 1925-29	8.5	8.4	8.3	8.0	7.6	7.7	7.7	8.0	7.9	8.9	9.0	9.2
1939	10.8	10.6	10.4	9.1	9.0	8.3	8.3	8.5	9.2	9.2	8.7	7.7
1940	7.0	6.3	6.0	6.1	6.2	5.9	6.2	6.2	7.7	8.0	7.9	8.2
1941	8.6	8.3	7.9	8.2	8.9	9.3	10.4	10.5	10.9	11.1	10.7	10.7
1942	10.5	10.5	10.9	10.9	10.8	11.0	11.5	12.1	12.2	13.0	12.7	12.3
1943	12.5	12.0	12.0	11.4	10.8	10.6	10.0	10.2	10.2	9.5	9.3	8.1

Egg-Feed Price Ratio

A dozen eggs was equal in value to 11.8 pounds of laying mash according to prices received by Louisiana farmers for eggs and prices paid by them for laying mash in January, 1943, as compared with 10.5 pounds a year earlier. The ratio declined continuously until June, when one dozen eggs was equivalent in value to 8.6 pounds of laying mash. The price of eggs rose more than the price of laying mash from June to December, 1943. The selling price of one dozen eggs in December was the same as the purchase price of 12.9 pounds of laying mash.

TABLE 4. Egg-Feed Price Ratio in Louisiana, 1939-43

Year	Month											
	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1939	8.6	6.5	5.6	5.5	5.6	6.0	6.7	7.5	8.2	8.8	9.2	9.5
1940	7.4	8.8	4.8	5.0	5.2	5.6	5.6	7.0	7.8	8.5	9.1	10.3
1941	9.3	6.3	5.3	6.7	6.4	7.1	8.7	9.1	10.2	10.7	11.9	13.8
1942	10.5	7.8	6.6	7.2	7.1	7.7	7.9	8.2	9.8	11.2	11.9	12.9
1943	11.8	10.0	9.0	9.2	8.6	8.6	9.0	10.5	10.4	11.4	12.3	12.9

Milk-Feed Price Ratio

On a basis of prices received by Louisiana dairymen for milk and prices paid by them for mixed dairy feed in January, 1943, one hundred pounds of milk was equal in value to 125 pounds of mixed dairy feed. A year earlier the same amount of milk was equal in value to 112 pounds of dairy fed. The price ratio became progressively less favorable for Louisiana dairymen throughout 1943. By December one hundred pounds of milk was equivalent in value to 115 pounds of mixed dairy feed. The milk-feed price ratio was more favorable for dairymen from January through July, 1943, than for comparable months of 1942; from August through December the ratio was less favorable for dairymen than for the same months of 1942.

TABLE 5. Milk-Feed Price Ratio in Louisiana, 1939-43

Year	Month											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1939	119	119	117	106	100	95	108	108	110	112	110	120
1940	117	115	112	107	105	105	108	116	121	120	128	122
1941	117	115	115	115	112	112	107	114	111	108	117	114
1942	112	109	112	106	102	102	106	112	115	119	132	124
1943	125	123	119	116	115	111	111	112	110	112	116	115

Monthly Farm Wages

Monthly farm wages with board in Louisiana increased 18 per cent from October 1, 1942, to October 1, 1943. The increase from October, 1939, to October, 1943, was 97 per cent. Monthly wages without board increased 25 per cent in 1943 and 125 per cent during the last four years.

TABLE 6. Farm Wage Rates, Louisiana, 1939-43

	Per Month With Board				Per Month Without Board			
	Jan. 1	April 1	July 1	Oct. 1	Jan. 1	April 1	July 1	Oct. 1
1939	14.75	15.25	15.25	15.25	22.50	23.00	22.75	22.75
1940	15.25	15.50	15.50	15.75	22.75	22.75	23.25	23.25
1941	15.25	16.50	17.50	18.50	23.00	24.00	24.75	26.25
1942	19.00	21.50	21.50	25.50	27.25	29.50	30.50	34.75
1943	25.00	27.00	29.75	30.00	35.00	39.00	43.00	43.50

Daily Farm Wages

The average daily wage rate with board in Louisiana increased 25 per cent from October, 1942, to October, 1943. The increase was 125

per cent from October, 1939, to October, 1943. The increase in daily farm wages without board rose 32 per cent from October, 1942, to October, 1943. Daily wages without board rose 105 per cent from October, 1939, to October, 1943.

TABLE 7. FARM WAGE RATES, LOUISIANA, 1939-43

	PER DAY WITH BOARD				PER DAY WITHOUT BOARD			
	Jan. 1	April 1	July 1	Oct. 1	Jan. 1	April 1	July 1	Oct. 1
1939	.80	.80	.80	.80	1.05	1.05	1.05	1.10
1940	.80	.80	.80	.80	1.05	1.05	1.05	1.05
1941	.80	.85	.90	1.00	1.05	1.10	1.15	1.30
1942	1.00	1.05	1.10	1.40	1.25	1.30	1.35	1.70
1943	1.35	1.40	1.50	1.80	1.70	1.75	1.85	2.25

Milk Transportation in War-Time . . .

A. The Shreveport Milkshed . . . William H. Alexander

Transportation of perishable farm products, like milk, is essential. Continued attempts are being made to maintain production and delivery of milk to all areas of the State in spite of dwindling transportation facilities and more rigid requirements for new trucks and tires.

In a 1943 study of the production and transportation problems in the Shreveport milkshed, it was found that more attention should be given to efficient utilization of present transportation facilities. The work was carried on with the cooperation of dairymen, milk haulers and others concerned with the problem of arranging milk routes so as to reduce the mileage traveled as much as possible and still collect all the milk produced.

Thirty-five per cent of the dairy farmers delivered their own milk to dealers in Shreveport and produced 42 per cent of the total supply in April, 1943. They did not haul milk for other farmers, and their 49 trucks constituted 72 per cent of all trucks used. Only 68 per cent of the capacity of their trucks was utilized while the trucks on commercial routes were utilized to 117 per cent of their rated capacity. This capacity utilization was for the month of April which is near the peak production period, therefore, less efficiency probably existed during the months of lower production.

Table I indicates the volume of milk hauled by commercial routes and by individual producers.

TABLE I. The Volume of Milk Hauled by Commercial and Self-Haulers in the Shreveport Milkshed in April, 1943

Type of Hauler	Bossier	Caddo	Claiborne	DeSoto	Harrison County, Texas	Total	Percentage of Total
	Pounds of milk						
Commercial	18,285	312,333	216,402	615,636	73,972	1,236,628	50.63
Self	136,094	497,895	None	312,877	78,527	1,025,393	41.99
Other	7,146	103,535	None	69,554	None	180,235	7.38
Total	161,525	913,763	216,402	998,067	152,499	2,442,256	100.00

Sixty-seven trucks were being used to deliver wholesale milk to dealers in Shreveport in April, 1943, as shown by Table II.

TABLE II. The Number of Trucks Used on Commercial Routes and by Self-Haulers in Transporting Milk From Farms to Dealers in Shreveport in April, 1943

Type of Hauler	Bossier	Caddo	Claiborne	DeSoto	Harrison County, Texas	Total	Percentage of Total
	Number of trucks						
Commercial	1	3	2	7	1	14	21
Self	6	25	0	16	1	48	72
Others	1	2	0	2	0	5	7
Total	8	30	2	25	2	67	100.

The study revealed the need for cooperation among the interested groups in order to formulate new routes and reorganize existing ones to reduce the number of individual haulers to a minimum. This would benefit the dairy farmers in a number of ways. The first and paramount benefit would be the elimination of waste of trucking equipment, tires and gasoline. Secondly, dairy farmers would eliminate the waste of numerous hours of manpower required to individually deliver their milk to market. Third, the cost of getting the milk to market is less if full capacity of trucks is utilized. Fourth, congestion of trucks at milk plants during the unloading period would be eliminated.

B. The Monroe Milkshed . . . J. M. Baker

A survey was made of milk supply in the Monroe area, the quantity of milk needed for civilians and the armed forces at Monroe, and the

methods used in the transportation of milk in relation to the conservation of rubber for tires, of trucks, and of labor. During April, 1943, 19 bottle-milk and 44 can-milk producers located in nine parishes delivered 630,175 pounds of raw milk to the Monroe market. The can-milk was delivered to two distributors for final disposition. The quantity of milk marketed monthly by 21 producers from April, 1942, to March, 1943, varied from 236,222 pounds in July to 156,287 pounds in February. The shortage during the winter months was overcome by drawing milk from a larger area. In April, 1943, the price at Monroe for can-milk containing 4 per cent butterfat was $4.00 per 100 pounds.

The supply of labor on dairy farms declined 22 per cent from April, 1942, to April, 1943, and complaints of labor shortages were frequently made. Wages for hired labor on dairy farms advanced during the year about 66⅔ per cent. Good dairy feed was scarce and the price increased 33⅓ per cent during the year.

The methods used in transporting milk to the market were found to be efficient. Attention had been given to consolidating delivery routes to conserve trucks, rubber tires, and labor. Many producers were of the opinion that the margin between the cash cost of production and the price received for milk was too small to guarantee an adequate future supply in the Monroe market. During the year ending in July, 1943, the number of dairy cows decreased by 6 per cent in the Monroe area. However, the dairy cows disposed of were largely of the poorer grades. Through better feeding and care, more milk was produced with fewer cows. (For detail information ask for Mimeographed Circular 35 of the Department of Agricultural Economics.)

Cost of Producing Sugar Cane on Large Farms and on Manufacturing Raw Sugar in Louisiana

Roy A. Ballinger

Financial results on large farms were even better in 1942 than in 1941. Costs of producing sugar cane on large farms were nearly 60 cents per ton higher in 1942 than in 1941, but the gross income was $1.60 higher. Net income per ton of cane ground by the mills was somewhat lower in 1942 than in 1941, although higher than in any of the other years. The intensive analysis of the three prior years 1939 to 1941 showed that both farms and mills in the Teche region were slightly more profitable than those in the Mississippi region. An important factor affecting costs on farms was the yield of cane per acre, while for the mills the amount of sugar obtained per ton of cane ground was of great significance. (For further information, see Mimeographed Circulars numbered 37 and 38 of the Department of Agricultural Economics.)

Soybeans for Oil as a Wartime Crop

Frank Barlow, Jr.

A study of farmers' experience in Louisiana with the production of soybeans for oil shows that further wartime expansion beyond the 66,000 acres planted in 1943 should not be recommended. At 1942 price relationships, the return per acre from soybeans was $7.38 as compared with $15.98 from oats, $16.07 from corn, and $85.75 from cotton. Cotton requires approximately 19 times as much labor per acre as soybeans and two times as much as corn. Soybean production does not compete seriously with cotton for labor, but it does with corn. The yields of soybeans, even in the Delta areas of Louisiana, are low in relation to yields obtained under climatic conditions more favorable for their growth in the North Central States. Small farms in Louisiana are not usually adaptable to growing soybeans for oil. Those plantations that do not have important livestock enterprises should find it feasible to make substitution of soybeans for feed crops. (For detailed information on soybeans as a wartime crop, see Louisiana Experiment Station Bulletin 369.)

Wartime Production Capacity on Louisiana Farms

B. M. Gile

The Department of Agricultural Economics in cooperation with the Bureau of Agricultural Economics made a study of maximum food production capacity of Louisiana farms under wartime conditions. The production capacity of each type-of-farming area was projected for 1944 and 1945. The data and analysis are available in Mimeographed Circular 34 of the Department of Agricultural Economics. The report represents one of the important contributions made by the Louisiana Experiment Station to help bring about the adjustments required for maximum production of the food, oil and fiber needed to help win the war. The data in the report referred to above were used by the State War Boards, the A.A.A. and the Agricultural Extension Division in connection with the establishment of 1944 production goals and in localizing the demand for greater outputs to those parishes best suited for the production of specific farm products.

Free Range of Cattle in Louisiana

B. M. Gile and W. T. Cobb

Additional data on the extent of use of free range for cattle in Louisiana were obtained during 1943. These data have a practical bearing on the question of whether there should be state-wide prohibition of free range on unfenced lands. The new data given below show that 56

per cent of the farmers in twenty parishes entirely open to free range depend upon free range as a feeding support for their cattle. In most free range areas, a considerable percentage of both owned and rented farms are too small to provide the amount of pasture needed for the present amount of livestock possessed by their operators. To remove the danger to travelers from livestock on highways without disturbing the livestock economy, consideration might be given to fencing the main highways by the State.

TABLE. FREE RANGE FOR CATTLE IN LOUISIANA, AMOUNT OF FREE RANGE LAND NUMBER AND PERCENTAGE OF FARMERS BENEFITTED AND CATTLE USING FREE RANGE LAND IN 1943

A. THE STATE OF LOUISIANA.

ITEM	Unit	Number used or using	Percentage of total in Louisiana
Land used for free range	Acres	10,488,460	36
Cattle using free range	Head	339,816	32
Farmers using free range	Number	46,350	31

1. The estimated value of all cattle in 1943 making some use of free range in Louisiana is $14,479,000.

B. TWENTY PARISHES WITHOUT LEGAL RESTRICTION ON FREE RANGE ON RURAL LANDS OUTSIDE OF TOWNS AND VILLAGES.

ITEM	Unit	Number used or using	Percentage of total in area
Land used for free range	Acres	6,077,664	61
Cattle using free range	Head	198,380	56
Farmers using free range	Number	27,483	56

C. TWENTY-TWO PARISHES, EACH HAVING A PORTION OF ITS RURAL LAND AREA CLOSED BY LEGAL RESTRICTION.*

ITEM	Unit	Number used or using	Percentage of total in area
Land used for free range	Acres	4,261,843	43
Cattle using free range	Head	137,358	37
Farmers using free range	Number	17,586	32

*A small map showing the parishes included under *B.* and *C.* will be sent upon request.

Agricultural Engineering

* * *

The Effect of Organic Matter, Deep Plowing, and Vegetable Cover on the Runoff, Erosion and Crop Yields of the Lower Mississippi Loessial Soils . . .

Harold T. Barr and James B. Holley

This is a cooperative project between the Agricultural Engineering Department of Louisiana State University and the Division of Water Conservation and Drainage, Soil Conservation Service, U. S. Department of Agriculture.

By using a winter cover crop of Austrian winter peas and turning it under, the reduction in erosion amounted to 50 per cent where the land had been subsoiled and 90 per cent where plowed but not subsoiled. Subsoiling with no cover crop increased the cotton yield 25 per cent, but when a cover crop was grown and turned under, the subsoiling increased the cotton yield 6 per cent.

Even with a year of slightly below average rainfall, a winter cover crop must be kept on the land to prevent excessive erosion during fall and winter.

The Influence of Certain Cropping Practices on Erosion and Crop Yields (1943)

	No Winter Cover Crop		Winter Cover Crop	
	Rows Reversed	Rows Reversed Subsoiled	Rows Reversed	Rows Reversed Subsoiled
Inches of Runoff per Acre	12.94	8.53	8.18	7.39
Soil Loss per Acre in lbs.	4,496	1,865	2,527	1,347
Seed Cotton Yield per Acre	610	814	1,188	1,266

The application of fertilizer and lime, and threshing the white Dutch clover seed resulted in a gross profit of $50 per acre on the second year's crop after application.

Sugarcane Machinery . . . Harold T. Barr

Weeds and grasses in sugarcane can be controlled successfully by the use of flame at a saving of from $2.50 to $3.00 per acre over hand hoeing. Johnson grass in the cane row can be controlled by flame if flamed before the grass is six inches tall and repeated at frequent intervals.

Eleven types of flame cultivators were in use in the Louisiana sugarcane belt last season with possibilities of some sixty to seventy-five being available for the 1944 season. A successful one row, two burner machine was made by buying a commercial tank and burners and mounting these on an old cultivator. A commercially manufactured unit designed for sugarcane will be ready for the 1944 crop.

Sweet Potato Dehydration . . . Harold T. Barr

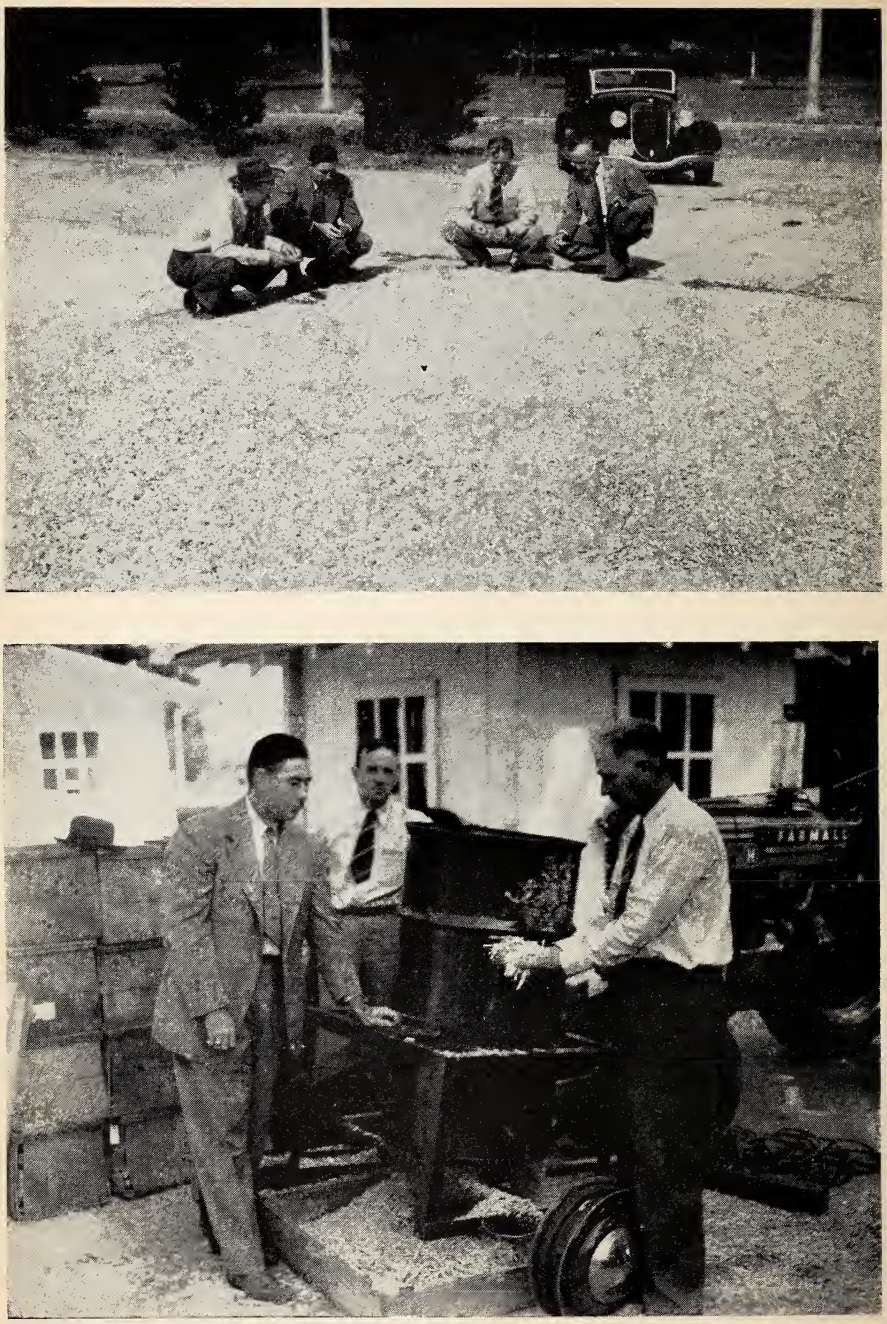
Sweet potatoes, after shredding into strings three-sixteenths to one-quarter inch in cross section, can be dried successfully in the sun for animal feed. For the large grower and commercial production, a rotary dehydrator is advisable. Both the Puerto Rican and high starch sweet potatoes were handled successfully. Excellent feeds were obtained in a con-current rotary dehydrator using temperatures up to 1400 degrees F. with an air travel of 335 feet per minute. Cost of dehydration can be figured at approximately $6.00 per dry ton of feed, not counting any overhead.

Sweet Potato Machinery . . . Leland E. Morgan

The conventional mechanical Irish potato harvester was adapted to sweet potato harvesting with minor changes. The vines must be removed prior to digging to prevent clogging of the digger.

A sugarcane stubble shaver gave the best results in removing vines, however, it is not economical to purchase one for less than about 80 tons of potatoes. By dragging the vines off with a plow or a sled equipped with a knife, the digger worked satisfactorily.

In heavy soils more agitators were necessary to separate the potatoes from the soil; however, when the soil was damp, mechanical harvesting was not satisfactory. Mechanical diggers and pickers (for sacking the sweet potatoes) can reduce the harvesting time for a yield of 200 bushels per acre, from approximately 60 man hours per acre to 10 man hours per acre. The cost is reduced from about $18 to $5 per acre. Approximately 60 per cent of the 119,000 acres harvested in 1943 could have been handled mechanically. With a saving of $12 per acre this would represent a yearly gain of about $850,000 for the sweet potato growers of Louisiana.



Shredding and drying (natural) of sweet potatoes for stock feed. Shredder built by Agricultural Engineering Department. Cooperative work between Horticulture and Agricultural Engineering Departments.

Rice Harvesting, Drying, and Storage . . .

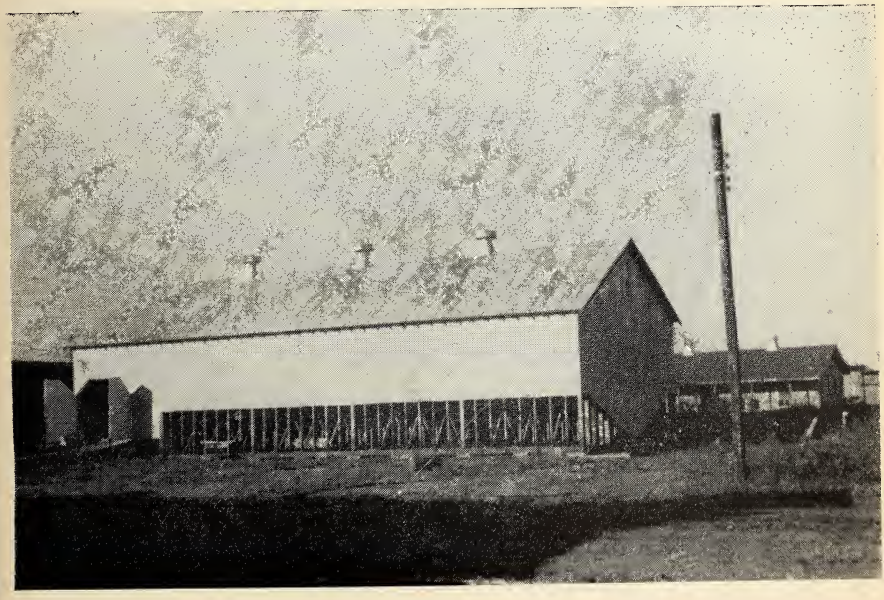
Harold A. Kramer

The combining, artificial drying, and bulk handling of the rice crop is now being adopted in all sections of the Louisiana rice area. The new self propelled rice combines have proven their ability to harvest rice more efficiently from the standpoints of total grain saved and cost of harvesting, than any other method.

Excellent artificial drying results have been obtained where the temperature of the drying air was regulated according to the humidity of the atmosphere and moisture content of the rice.

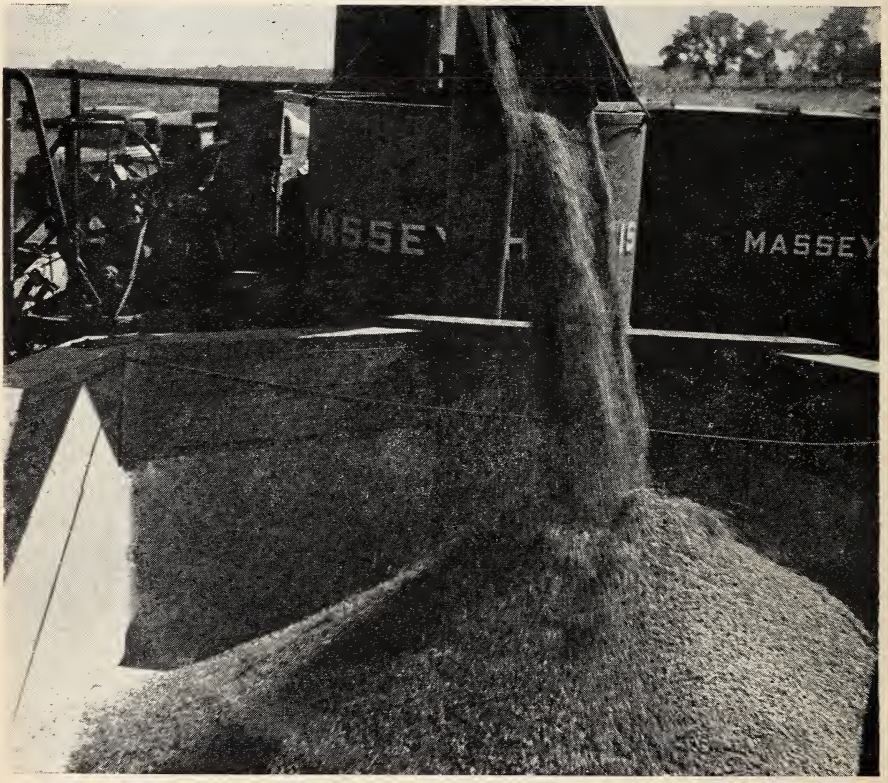
Pressure measurements made in rice bins of crib construction and with ordinary diameters of 10 to 12 feet, indicate the maximum horizontal and vertical pressures are reached at a depth of about three bin diameters. The angle of repose for Blue Rose rice of 14 per cent moisture content and 45 pounds cup weight was measured at approximately 34 degrees. Rexora rice of the same moisture content but 48 pounds cup weight had an angle of repose slightly less than 32 degrees.

The coefficient of friction between rice and wooden bin wall of crib type construction was measured and found to be 0.58 for Blue Rose rice

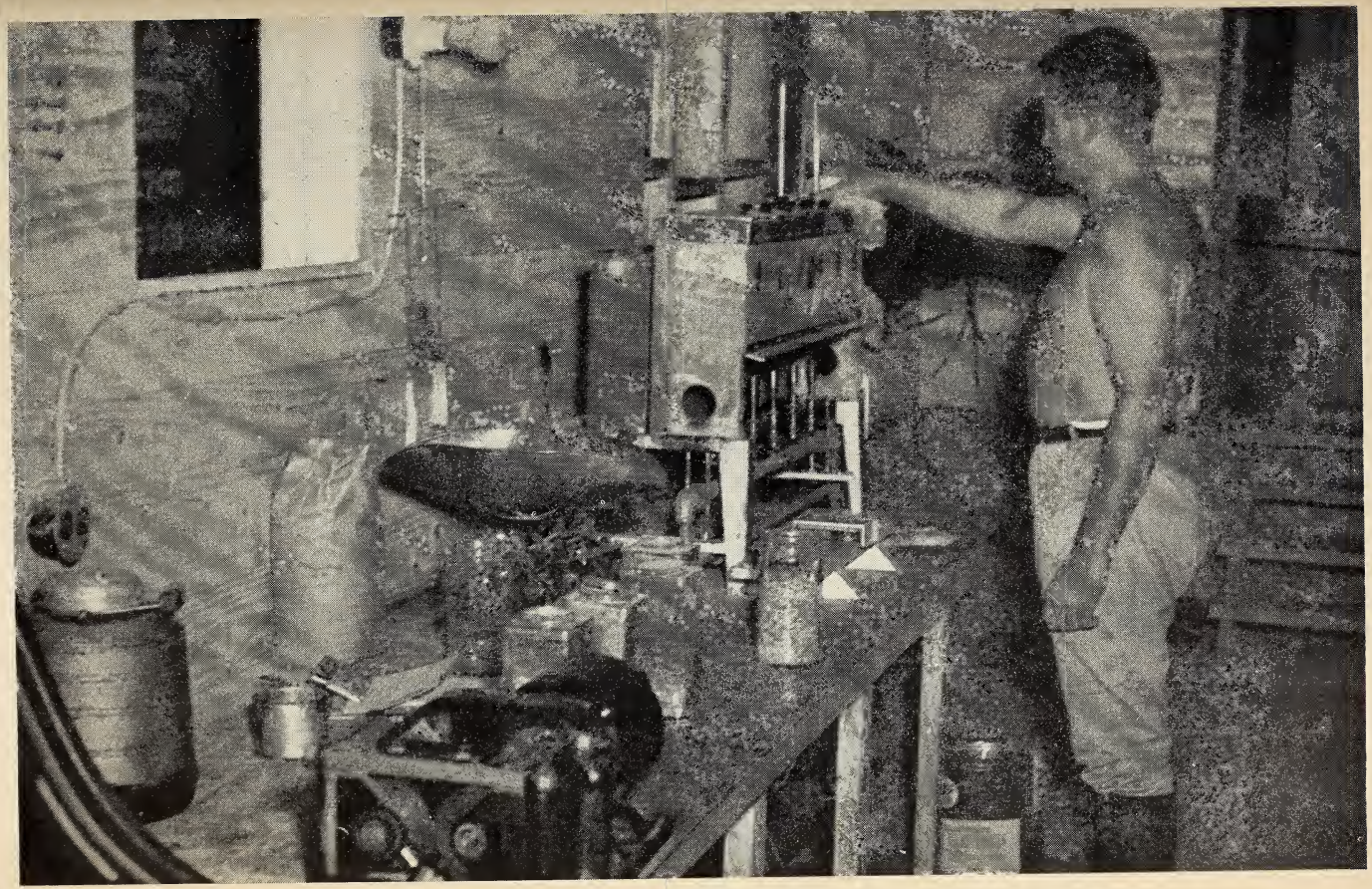


A Very Satisfactory Type of Bulk Storage Equipped to Handle Bulk Rice Threshed from the Shock

Three Fourteen-Foot Self-Propelled Combines Doing Excellent Work in a Large Rice Field

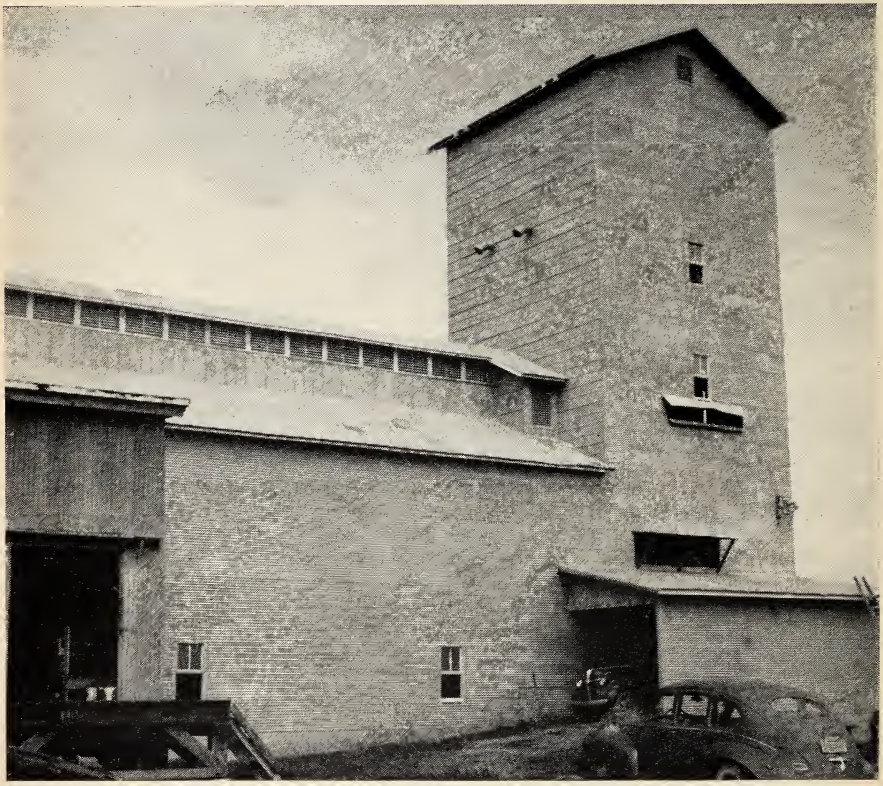


Transferring Rice Directly from Combine to Truck Before Hauling to the Drier



A Moisture Testing Laboratory, an Essential Part of Every Successful Rice Drying Plant

and 0.53 for Rexora rice. Combined rice continues to respire and give off moisture for a period of time, even after it has been artificially dried to 14 per cent. This factor must be considered in the storage of such rice to prevent an accumulation of excess moisture at some point. A tendency for moisture to accumulate at the top center of a mass of rice in bulk storage has been observed where adequate ventilation was not supplied.



A Modern Rice Drying Plant

Animal Industry

* * *

Southern Plant Protein Supplements Excellent for Fattening Swine . . . C. I. Bray

In 1943, eight lots of pigs, weighing around 110 pounds, were used in comparing various protein supplements. Corn was the carbohydrate feed; supplements of tankage, soybean oil meal, peanut oil meal and cottonseed meal were fed either alone or in various combinations. Slightly higher gains were made in the lots receiving peanut oil meal alone or in combination, but there was little difference between this meal and soybean oil meal in economy of gains. Tankage as the only supplement was not as economical as tankage and soybean oil meal, or tankage and peanut oil meal. Tankage and cottonseed meal made next to the lowest gains and required the largest amount of feed per 100 pounds of gain. Peanut oil meal and soybean oil meal when obtainable can be used to advantage in replacing some of the higher priced animal proteins, such as tankage or shrimp meal.

In one lot, sun-dried shredded sweet potatoes replaced half of the corn in the ration. These dried potatoes were ground in a hammer mill and fed as a meal. The pigs on the sun-dried potato ration made excellent gains, practically the same as in the best of the other lots, but it required 206.7 pounds of dried sweet potatoes to equal 183.3 pounds of corn and protein supplement. Sweet potatoes may be shredded and sun-dried so as to keep for seven or eight months without deterioration. Some of the dried potatoes that were not used in the experiment kept until midsummer without apparent spoilage.

Renovation of Beef Cattle Pastures . . .

C. I. Bray and S. E. McCraine

In the fall of 1942 the six experimental pastures which were seeded in 1938 had become sod-bound and were producing only half as much as in 1939, 1940, and 1941. In order to try out various methods of renovation, the pastures were disced or plowed and reseeded according to the following plan:

Pasture 1—Disced but not seeded
Pasture 2—Disced and seeded with red clover
Pasture 3—Check; neither disced nor seeded
Pasture 4—Disced and seeded with red clover and Dallis grass
Pasture 5—Disced and seeded with Alsike clover and Dallis grass
Pasture 6—Plowed and seeded with Alsike clover and Dallis grass

Severe winter weather in early 1943 froze back the young clover on two separate occasions, so that the new clovers did not become as well established as was expected.

These pastures were grazed the first year at the rate of one head per acre. The most important difference was between Lot 1, disced without reseeding, and Lot 3, neither disced nor seeded, as shown in the accompanying photographs. The pastures produced as follows under light grazing in 1943:

Lot 1—Disced, not seeded, 212 pounds gain per acre
Lot 2—Disced, red clover, 218 pounds
Lot 3—No treatment, 164 pounds per acre
Lot 4—Disced; red clover and Dallis grass, 227 pounds
Lot 5—Alsike clover and Dallis grass, disced, 194 pounds
Lot 6—Alsike clover and Dallis grass, plowed, 191 pounds

Very little difference could be observed in the total pasture on the five renovated lots.

The lack of clover in the check lot was very noticeable in 1944 and on May 19, this lot was producing only a little over one-third as much gain as the renovated pastures. Pasture 6, plowed and seeded, appeared to have been grazed more heavily than the others.

Lot 3 Lot 1

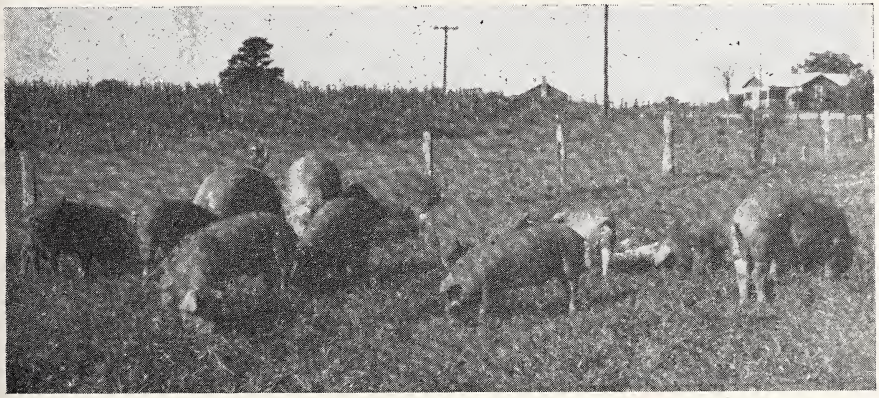
Discing Sod-Bound Pastures Gives White Clover a Fresh Start and Greatly Increases Grazing Capacity.

Swine Production—Hogging Off Corn and Soybeans, Sweet Potatoes, and Peanuts at the North Louisiana Station . . . C. I. Bray, Dawson Johns, and J. L. Heath, Jr.

In 1942 the Louisiana Legislature made a special appropriation for experimental work with swine at the North Louisiana Experiment Station at Calhoun in regard to feed crops for the hill land areas. A tract of approximately 6½ acres was set aside for the purpose of compar-

ing various feed crops suited to the hill sections of the state. Two acres of oats were put in for winter pasture. For feed crops, 2 acres were planted to corn and soybeans, 2 acres to sweet potatoes and 2 acres to peanuts following the oats. Due to extremely dry weather in midsummer, the yield of corn and soybeans and of sweet potatoes was much lower than anticipated, being only 20.7 bushels per acre for corn and 74.5 bushels per acre for sweet potatoes. The peanut crop was practically a failure on account of the drouth.

The gains on corn and sweet potatoes were good considering the low crop yields, but the pigs finished at light weights. Six hundred thirty-four pounds of gain were produced on corn and soybeans (317 pounds per acre) and 635 pounds on sweet potatoes, or 317 pounds per acre. The gain on peanuts was negligible, being only 163 pounds. Corn and soybeans followed by sweet potatoes normally will be sufficient to finish spring pigs for market, leaving the peanuts for late fall grazing for sows and small pigs.



Duroc Pigs Finished on Corn and Sweet Potatoes at the North Louisiana Experiment Station Grazing on Fall Oats.

Breeding and Selection of Duroc Swine for Increased Production . . . C. I. Bray

Work is being continued on this project and one additional sow has qualified for the Advanced Production Registry. Sow pigs and barrows fed out in the early part of 1943 from each of the Duroc litters showed that pigs from advanced registry sows or their daughters made the most rapid gains both from birth to market and during the fattening period. Gains on the feeding tests varied from 1.27 pounds per day for the poorest litters to 1.90 pounds per day for the best litters.

Selecting swine on the basis of production is practicable and effective in building up strains of hogs that are prolific and that make rapid growth in the feed lot.

Systems of Raising and Fattening Calves and Yearlings For Market at Different Ages . . .

S. E. McCraine and C. I. Bray

This is a preliminary report on a project comparing various methods of finishing beef calves and yearlings for market, such as finishing off grass at weaning time, creep feeding, finishing in dry lot or finishing on grass as yearlings. In 1943 one group of calves was creep fed in comparison with calves raised on pasture alone. Ten calves from the creep fed lot, avering 409.6 pounds, were put on feed on November 11, in comparison with ten calves raised on pasture alone, averaging 386 pounds. The creep fed calves were valued at $12.76 per 100 pounds, or $52.29 per head and the calves from pasture alone valued at $11.32 per 100 pounds or $43.70 per head, a difference of $8.59 per head.

At the close of the winter feeding period, the creep fed group was appraised at $14.78 per 100 pounds or $85.51 per head and the other lot $14.57 per 100 pounds or $83.90 per head.

The calves creep fed in summer (Lot 1) made 21 pounds less gain per head in the feed lot than those raised without grain, and the increase in value for Lot 1 during winter feeding was only $37.80 as compared to $46.88 for Lot 2. Winter feeding creep fed calves was not as profitable as feeding calves not creep fed in summer.

Good Management Pays in Producing Beef Calves for Market . . . S. E. McCraine and J. B. Francioni

This was the final year of a four year test comparing two methods of handling beef cows. Two herds of approximately thirty-five cows each were handled on similar areas of eighty-eight acres each. One of these pastures (Lot 1) was divided into two equal parts, hay was put up for wintering, the pastures mowed regularly, and the cattle rotated between the two pastures. In Lot 2 no hay was put up, and the pastures were not mowed. In some winters it was necessary to provide extra feed for the cows in Lot 2. The first year there was little difference between the two lots, but as the experiment progressed greater differences appeared in favor of improved methods of management.

In 1943 the percentage calf crop weaned in Lot 1 was 91.7 per cent and there was produced 15,025 pounds of calves valued at $1,935, an average of $56.94 per cow. On the unmowed pastures, with no winter feed provided, the percentage calf crop was 82.8 per cent and the total production was 12,144 pounds of calves valued at $1,482 or $42.39 per cow. The cows in Lot 1 averaged 1,087 pounds in weight in the fall

and were valued at $98.72; the cows in Lot 2 averaged 955 pounds with a value of $70.75, a difference of $27.97 per head. In addition six heifers pastured in Lot 1 during the grazing season gained a total of 1,081 pounds worth $124.10.

The difference in favor of better management was $576.00 or $6.54 per acre with no credit allowed for the greater weight of the cows in Lot 1. Allowing for the increased value of the cows in Lot 1 the difference was $11.12 per acre in favor of Lot 1.

Hill Land Pasture Investigations . . . C. I. Bray

Due to extremely dry weather conditions in North Louisiana in 1943 the hill land pastures were seriously reduced in productive capacity and in one case the pasture was so severely damaged that no grazing was attempted. At the Ringgold Station fair gains up to 133 pounds per acre were made to June 18 when the cattle were taken off pasture temporarily until July 1, but as the dry weather continued and the cattle were losing weight the test was abandoned for the year. At Dry Prong, gains were about half as great as in 1942. The results obtained at Dry Prong in 1943 were as follows:

Old crop land	limed and fertilized	66.8 pounds per acre
Old crop land	fertilized, no lime	50.2 pounds per acre
Old crop land	unfertilized	—18.0 pounds per acre (loss)
Woodland	fertilized, some lime	47.0 pounds per acre

In the check herd, on unfertilized woods pasture, cows and branded young cattle gained 54 pounds per head as compared to 110 pounds gained by cows and yearlings on the fertilized pastures. On the other hand, calves running in the woods made slightly better gains than the calves on the fertilized pastures, probably due to more shade and less parasite infestation. Some of the cows in the unfertilized woods pasture showed some evidence of mineral deficiency.

Crops and Soils

* * *

Cotton Breeding . . . H. B. Brown

Cotton breeding involves much routine work which must continue year after year without much apparent gain. Since we already have a number of good cotton varieties, it is a difficult matter to produce something better. In addition to the Delfos, Stoneville, and Dixie Triumph varieties that we have introduced, we have developed a number of other strains of cotton of considerable merit, but they were not introduced because they appeared to be no better than other good varieties being grown already. It is only the strains that are outstanding in certain features that merit increase. At present we have a hybrid between Miller and Deltapine 11 that has good staple length and uniformity, excellent lint percentage, fair boll size, and, to date, has been a good producer. We also have a selection from Delfos 425 that appears to carry the wilt resistance of the parent strain but is a better producer and has a somewhat better lint percentage.

In parts of the State there seems to be a demand for an extra staple cotton like Sea Island, but one that is a better producer. In an effort to meet this demand we made a cross between Tidewater and an unnamed non-commercial variety which gave us some hybrids with very fine long staple.

Any of the selections and strains mentioned above that continue to show unusual merit will be increased and introduced. (For data on cotton varieties in Louisiana see Annual Preliminary Report issued by Crops and Soils Department, Louisiana Agricultural Experiment Station.)

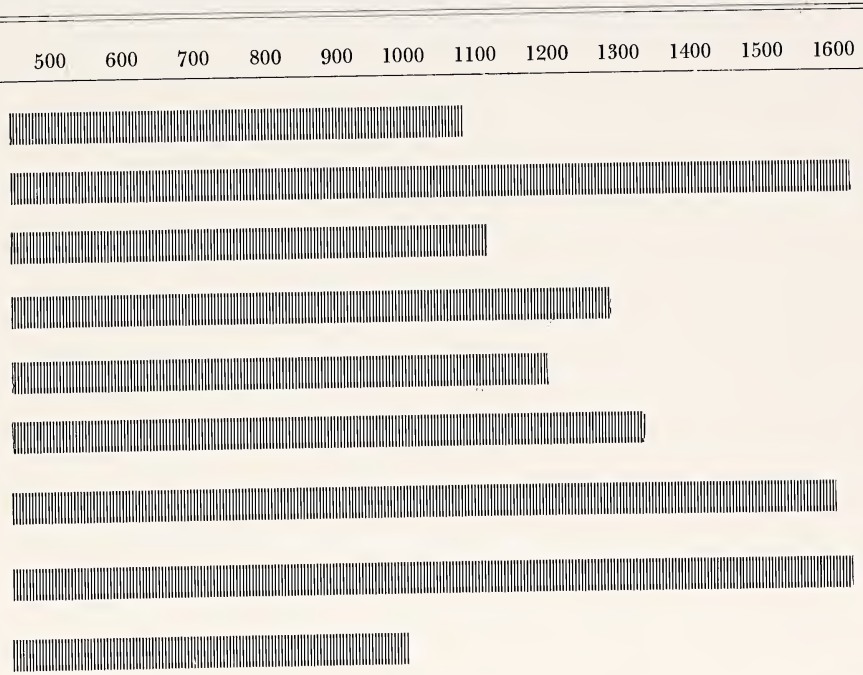
Does It Pay to Grade and Treat Cotton Planting Seed?

H. B. Brown

Since it costs $12.00 to $15.00 a ton to grade and treat cotton planting seed with Ceresan, the question is sometimes raised as to whether or not the practice pays. In an experiment designed to get some information on this, seven different treatments running through ten replications were tried. It was found that the seed grading gave no significant increase over the use of well ginned, ungraded seed, but the use of Ceresan gave consistent and significant increases. The use of ten cents worth of Ceresan on the seed, on basis of a four-year average, gave an increase of 100 pounds of seed cotton.

Effect of Fertilizers on Rate of Cotton Blooming

H. B. Brown



Treatment	Number blooms
1. Check (no treatment)	1103
2 1000 lbs of a 5-10-4 Fert.	1684
3 50 lbs. Nitrogen from nitrate of soda	1178
4 100 lbs P_2O_5 from 20% superphosphate	1327
5 40 lbs K_2O from muriate of potash	1232
6 50 lbs N. and 100 lbs P_2O_5	1381
7 100 lbs P_2O_5, 40 lbs K_2O and 20 tons barn manure per acre	1662
8A 1000 lbs of a 5-10-4 fert. and an additional inch water per week	1675
8B 1000 lbs complete fert. and no rain after June 27	1045
Total	12287

Fertilizers and other treatments were applied as indicated above. Bloom counts made throughout the season show that the complete fertilizer was instrumental in increasing the blooming rate considerably, while a reduction in the rainfall lowered it.

Effect of Date of Blooming on the Percentage of Set of Cotton Bolls . . . H. B. Brown

In a study of the effect of various fertilizers on the quality of cotton fiber, some 2000 blooms were tagged and dated, the dates being June 29, July 6, July 19, and August 2. The plants were blooming freely at the first three dates, being the heaviest, 840, on July 19. On August 2 there were 175 blooms. Of the June 29 blooms, 79.6 per cent made bolls; 73.2 per cent of the July 6; of the July 19, the date of heaviest blooming, 24.7 per cent; while on August 2, although the plants were still blooming rather freely, only 4.5 per cent made bolls. In south Louisiana, when cotton is planted about April 20, not many bolls can be expected to set after August 1.

Volunteer Winter Legumes For Corn at Baton Rouge . . . H. B. Brown

The main object of this experiment was to find a winter growing legume that would serve as a good cover crop, add a liberal quantity of nitrogen to the soil, and ripen a crop of seed in time for turning under prior to corn planting. Crimson clover, hop clover, creole peas, Melilotus indica, Singletary peas (Lathyrus pusillus), and bur clover were tried in comparison with 150 pounds of nitrate of soda for a three-year period. The various crops were seeded in the fall and then let stand until it was necessary to turn them under to plant corn—this date being not later than May 20. Corn planted later than this yields poorly on account of rust attacking the plants.

The creole peas failed to produce seed on account of winter killing. Singletary peas were too late in producing seed to be satisfactory, and the Melilotus indica did not produce good growth until one year after the soil was limed with a ton of lime per acre. Bur clover was the most efficient, with crimson clover a close second. On the basis of a three-year average, both of these legumes increased corn yields about five bushels more per acre than did 150 pounds of nitrate of soda.

Depth of Planting Winter Cover-Crop Seed . . . H. B. Brown

In 1940 some plantings were made at Baton Rouge, St. Joseph, and at Calhoun to determine the best depth of coverage for certain cover-crop seed. Austrian winter peas, hairy vetch, common vetch, Lathyrus pusillus, bur clover, Melilotus indica, and oats were used at one or more of the locations mentioned each year for a three-year period. The seed were planted at various depths ranging from surface planting to a depth of eight inches. A coverage of two inches gave best stands for all the

crops except bur clover and Melilotus indica. Surface planting gave best stands for these two. With increase in depth beyond two inches there was a regular reduction in both emergence of plants and inoculation. (A bulletin giving in detail the results of the experiments mentioned above is in press and will be issued soon by the Louisiana Agricultural Experiment Station.)

Flax as a Winter Crop for South Louisiana . . .

H. B. Brown

Flax has been grown in parts of the United States for many years. Fiber flax was grown in several of the colonies for making homespun cloth during colonial days, but with the increase in cotton production, its use declined. At present it is being grown in a limited way in Michigan, Oregon, and Washington. Before the present war started a considerable quantity of flax fiber was being imported from Russia, Belgium, and the Baltic countries for use in the American flax-spinning mills.

To produce good fiber, flax plants require considerable cool, damp weather such as prevails in parts of Michigan and the Pacific Coastal area of Washington and Oregon.

During comparatively recent years attempts have been made at growing fiber flax in several southern states—North Carolina, South Carolina, Georgia, Tennessee, and Virginia—without much success, the yields being only fair and the quality of fiber being below average. These plantings were all made during the spring and the plants usually experienced some hot, dry weather before reaching maturity. This was not conducive to the production of good fiber.

On October 21, 1942, a small planting of fiber flax was made at Baton Rouge with seed of the Cirrus variety obtained from a grower in Oregon. It was thought that the moist and rather moderate winter temperature of south Louisiana might be favorable for the growth of this crop. A good stand of plants was secured and they made fair growth until January 20 when the thermometer went down to 22 degrees. This killed about 50 per cent of the plants outright and killed the tops of the rest of them. These plants that had their tops killed sprouted out from below but the branches were rather spindling and made unsatisfactory growth. Seed flax plants of the Rio variety in the same cut, and planted at the same time, were damaged but very little by the freeze and none killed. The Rio strain had been grown as a winter crop in Louisiana and Texas for several years. Unless a fiber flax strain that has more winter hardiness can be obtained, fiber flax will not be a satisfactory crop for our area.

Experiments growing seed flax at Baton Rouge, started in 1938, were continued in 1942-43. The acre yield was 11.4 bushels. During the

five-year period the yields have ranged from about 12 to 15 bushels per acre, except in 1940 when the winter temperature fell to 14 degrees, the lowest in 30 years, a yield of only six bushels was obtained. However, this was about equal to the average production of the Country.

Small lots of flax seed have been distributed to several growers in south Louisiana for trial. Some of these men have made good crops but under wartime conditions flax can hardly compete with cotton, rice, or sugar cane as a profitable crop. However, it has been demonstrated rather conclusively that seed flax can be grown here and that it would be a fair crop for growing under normal conditions.

Hemp as a War Emergency Crop for South Louisiana

H. B. Brown

Hemp has been one of the important fiber crops of the world for many centuries. It is thought to have come from China originally where it was in cultivation more than 4000 years ago. Prior to the present war it was grown in a number of countries, including China, Japan, Russia, Hungary, Italy, France, Turkey, India, and Chile. The crop has also been grown more or less in certain parts of the United States since soon after the founding of the first English colonies. At present it is being grown commercially, to some extent, in Kentucky, Minnesota, Iowa, Wisconsin, Illinois, and Indiana.

Before the war started the bulk of the hemp fiber used in the United States was imported, but now with imports largely cut off, it is necessary to produce most of our hemp supplies in this country. With the idea of getting some information on the performance of hemp plants in south Louisiana, limited experiments were started on the experiment station farm at Baton Rouge in the spring of 1943. Plantings were made April 1 on plots of medium fertile, Olivier soil to which 300 pounds of a 5-10-4 fertilizer had been applied broadcast. The part intended for fiber was planted with a grain drill and that for seed in four-foot rows with hills three feet apart. Several seed were planted in a hill, then the plants thinned to about three per hill. The seed germinated quickly and the young plants started rapid growth, but before long the growth was checked in parts of the plots. This made the plants of the plots appear very irregular in size and height. This land, when planted in cotton during previous years, had produced a fairly uniform growth of cotton plants over the whole area. The hemp plants seemed to be much more sensitive to a difference in soil fertility and moisture conditions. A number of the staminate plants that had stopped growth soon began to bloom, although only 18 inches to 3 feet tall. With the coming of rains many of the plants started new growth, became considerably taller, then bloomed later. The plants in hills made good growth, attaining a height of 10 to 12 feet, the female or pistillate plants bearing a good

crop of seed. The best of the drilled plants attained a height of 6 to 8 feet, and produced a dry weight of about 4000 pounds per acre.

The plants were cut and shocked the latter part of June when the larger of the staminate plants were beginning to bloom freely. The shocks were allowed to stand in the field until October 1 at which date the plants were spread on the ground to ret. At this time an examination of the fiber showed it to be very weak on most of the plants, so nothing more was done with them.

This was only a very limited test for one year, under one set of conditions and by a person not experienced in growing hemp, but from results obtained, it seems rather doubtful if hemp is a crop suited to south Louisiana. The heat and rather extreme changes in moisture conditions tend to make the growth irregular. It is probably not good for the fiber to have to remain in the field from June until retting time in October or November.

Effect of Certain Hormones on Field Crops . . .

H. B. Brown and C. F. Moreland

Due to considerable public interest in the effect of hormones (chemical growth-promoting substances) on the growth and fruiting of field crop plants, a limited amount of experimental work has been carried on by the writers with these substances during the past two years. It was observed that soybean seed soaked in .01 per cent naph. acetic acid for three hours germinated almost as quickly as similar seed soaked in water. Soaking seed in .05 per cent naph. acetic acid for three hours delayed germination considerably. In eight days only about one-fourth of the seed had germinated, but later they nearly all did. During the growing season no difference could be observed between the treated and untreated rows, and later when equal areas were cut for hay and weighed, no significant difference was found.

Somewhat similar experiments to those outlined above were tried on cotton. Six 1/100-acre plots were planted with untreated seed; six had the seed dusted with Staleymone (levulinic acid in soyflour); six had both seed and flowers dusted with Staleymone; and six had only the flowers dusted. Germination counts made in the plots 26 days after planting showed an average of 476 plants per plot for the untreated seed and 283 for the treated. However, the plants on the treated plots were well distributed and after thinning there was a good stand on all plots. Studies made later in the season showed no consistent difference between treated and untreated plots in regard to boll opening, boll size, staple length, or lint production.

Staleymone was also dusted on corn seed and the silks and adjacent parts of the corn plants at the time they were in flower. Four ounces of the dust per bushel were used on the seed, and about 15 pounds per

acre at each application on the silks. The seed treatment had no harmful effect on germination. At harvest the yields of the treated plots were not significantly better than those of the untreated.

Although some rather striking claims have been made in the public press in regard to the benefit of hormones on plants, it seems rather doubtful, judging from our experiments running through a two-year period, if they are beneficial to field crops.

Experiments with Dallis Grass Seed Production . . .

C. R. Owen

Strains of Dallis grass which showed promise in 1942 tests at Baton Rouge were planted at other locations of the state. The 1942 tests at Baton Rouge were continued in 1943. Two seed harvests were made from all tests. New progeny tests were planted at Hamburg, Louisiana, in further search for superior germ plasm. A more comprehensive survey of the germ plasm of this species was begun by making 3000 individual plant selections. Seed yields were obtained from all strains on test. Laboratory analysis is being made of samples of seed harvested.

Variation in total yield of seed per acre between strains was sufficiently large to be considered beyond the limits of chance. The acre yield of different strains at Hamburg, Louisiana, the region in which most of Louisiana's Dallis grass seed is produced, ranged from 446 to 225 pounds per acre. This is indicative of the possibility of improvement by selection. In this test representatives from the high, intermediate and low yielding strains from the tests conducted at Baton Rouge in 1942 were included. The quality of the seed was affected by the time of the season in which the seed were harvested. For example, seed harvested in July contained fewer viable seed than those harvested in September. Here again a difference was evident between strains. The greatest difference in quality existed between strains planted at Hamburg and those planted at Calhoun on coastal plains soils of North Louisiana. Seed produced on the sandy soils were definitely inferior in quality to those from the more fertile soils. Part of this difference was probably due to differences in local weather conditions.

The results of the investigations for 1943 show that Dallis grass seed production may be increased about threefold on the present acreage by giving more attention to methods of culture and by planting better strains. Under the prevailing economic conditions this is significant. In certain areas, Dallis grass seed production should become a major farm enterprise instead of being merely a sideline to clover seed production. By this means only, can the demands for seed for the planting of permanent pastures be met. Until adequate supplies of seed from improved strains are available, seed producers may resort to improved practices to increase the seed yield. It has been found in south Louisiana

that seed harvested in September and October generally are of better quality than those harvested in July and August. Delayed seed harvests would permit a longer grazing season if it were desirable. If seed fields are not grazed, it is considered best to control rank growing plants by mowing at intervals throughout the early part of the summer. Shading appears to weaken Dallis grass plants more than heavy grazing or continuous mowing practices.

Loss of Nitrogen from Soils of the Rice Area . . .

W. H. Willis and M. B. Sturgis

The study of the effects of flooding and temperature on loss of ammonia from soils of the rice area in Louisiana has been continued. Two widely distributed soils, one strongly acid and the other slightly acid, were subjected to flooding in flasks and treated with varying quantities and forms of nitrogen. A series in each case was also treated with limestone to neutralize the acidity. Duplicates of all treatments were kept at optimum moisture. Experiments were run at 80-85 degrees F. and at 100-105 degrees F. The amount of ammonia diffusing out of the soil through the flood water was determined at intervals over a period of 10 to 20 weeks. Changes in reaction of the soil and flood water and changes in available phosphorus and potassium in the soil were determined.

Flooding the soil at a temperature of 100 degrees F. caused the diffusion of large quantities of ammonia from the soil. During a 10-week incubation period 160 to 200 pounds of nitrogen per acre were lost from the flooded Crowley silty clay loam soil through the water by volatilization. Larger quantities were lost where nitrogen had been added to the soil, either as ammonium sulfate or as cottonseed meal The rate of loss was less with cottonseed meal. After sufficient time had elapsed for decomposition the rate of loss of ammonia from cottonseed meal was equal to that from ammonium sulfate. The pH of the strongly acid sample of Crowley silty clay loam in the flooded flasks increased from 4.2 to above 6.0 and that of another sample of the same type increased from 5.0 to 7.2. Where limestone had been added the pH was 7.8. The flood water became alkaline in all cases. The pH in the soil kept at optimum moisture increased only slightly except where limestone had been added. Flooding alone did not decrease the available potassium in the Lake Charles clay loam soil but where limestone had been added to the flooded soil it was decreased from 206 pounds per acre to about 40 pounds per acre. Conclusive results have not yet been obtained on the effect of flooding and lime on the available phosphorus but in general it appears that flooding slightly increases available phosphorus.

The results indicate that the loss of nitrogen is related to the amount present or added to the soil as well as to temperature and pH. The

loss of nitrogen applied as a fertilizer may be partially overcome by making two or three successive applications to the soil during the growth of the crop following removals of the irrigation water. It may also prove profitable to apply potassium at the same time.

Soil Analyses and the Establishment of Improved Pastures

W. J. Peevy, C. W. McMichael, R. H. Brupbacher, and M. B. Sturgis

During the past year the soils laboratory of the Agronomy Department has analyzed the soils and made recommendations for the establishment of over 900 improved pastures. The use of limestone has been increased very markedly and the better practices in fertilizing, liming, and seeding are being followed by thousands of farmers.

The soils of the Coastal Plain are generally moderately to very acid, and for clover pastures have lime requirements varying from nothing to about 3000 pounds of calcium carbonate per acre. There are very few areas that do not need lime, and usually the requirements are from 1000 to 3000 pounds of calcium carbonate or its equivalent per acre. Most of these soils are very deficient in available phosphorus and potassium. For establishing clover pastures, these soils usually need from 40 to 100 pounds of P_2O_5 and 25 to 50 pounds of K_2O per acre. These soils are also characteristically low in organic matter, and it is very desirable to apply manure or turn under legumes before seeding pastures.

The soils of the flatwoods areas of the Coastal Plain and Pleistocene terraces are more acid and have higher lime requirements than those in any other general soil area of the state. These soils have lime requirements varying from about 500 to 5000 pounds of calcium carbonate for clover pastures, and usually they need 2000 pounds or more of calcium carbonate or its equivalent per acre. These soils are generally very deficient in available phosphorus and potassium, and for establishing clover pastures need about 50 to 100 pounds of P_2O_5 and 25 to 50 pounds of K_2O. They also usually need some additions of organic matter. Where organic matter cannot be added previous to seeding clovers, the use of complete fertilizers such as 3-12-12 or 4-12-8 is advisable.

In the Coastal Prairie about one-third of the soil areas analyzed do not need lime, but about half of the areas analyzed need 2000 or more pounds of calcium carbonate or its equivalent per acre. These soils usually need from 40 to 80 pounds of P_2O_5 and 25 to 50 pounds of K_2O.

The soils of the Mississippi terraces (Pleistocene) and loessial hills are commonly moderately acid, but there are a few areas where the soils are calcareous. Where lime is needed, the requirements vary from about 500 to 3000 pounds of available calcium carbonate per acre. There are some areas that do not need phosphorus and some that do not need

potassium, but usually from 30 to 80 pounds of P_2O_5 and 25 to 50 pounds of K_2O. are needed.

In the Ouachita and Red River bottoms there are but few locations that need lime. There are some areas that need from 40 to 80 pounds of P_2O_5. Potassium is needed more commonly than phosphorus or lime, and where potassium is needed, the requirements vary from 25 to 50 pounds of K_2O.

There are very few locations in the Mississippi River bottoms that need lime, and comparatively more that need phosphorus. While the soils of the Mississippi bottom are not generally deficient in potassium, some of the areas analyzed have been found to be deficient in available potassium, requiring from 25 to 50 pounds of K_2O.

Usually where lime is needed, phosphorus and potassium are usually needed. It is not advisable to apply any appreciable amount of lime where phosphorus and potassium are deficient unless these latter elements are applied also.

The moderately acid to very acid soils of the State are generally deficient in both calcium and magnesium, and at least one fifth of the lime applied to these soils should be dolomitic limestone. Where basic slag is used to supply the needed phosphorus, the magnesium requirement will probably be furnished by the slag.

Outfield Experiments with Cotton, Corn and Soybeans

Fred A. Peevy

Outfield fertilizer tests on cotton during the past year show that an 8-8-6 and a 6-8-6 are well adapted grades for sandy loam Coastal Plain soils of north Louisiana when applied at the rate of 400 to 600 pounds per acre. On the Mississippi terrace soils 400 pounds of a 6-8-6 has given the best results except in the potash-deficient area of St. Landry Parish where a 6-8-12 was found to be a better ratio.

A corn fertilizer test on a Ouachita river bottom soil, Portland silt loam, in Morehouse Parish shows that the use of 34 pounds of nitrogen, 24 pounds of P_2O_5 and 50 pounds of K_2O per acre produced slightly more profitable yields than 34 pounds of nitrogen alone. In a rotation experiment on a similar soil in St. Landry Parish the application of 32 pounds of nitrogen per acre to corn and beans in a two-year rotation with cotton that received 600 pounds per acre of 0-8-6 annually produced eleven bushels of corn per acre more than the unfertilized rotation.

In a two-year rotation at Simsboro, on a sandy loam Coastal Plain soil, corn that received 24 pounds of nitrogen per acre and was rotated with cotton that received 400 pounds of 6-8-6 per acre annually produced 12.5 bushels of corn per acre more than the corn in the unfertilized rotation.

A rotation experiment at Alexandria on Red River bottom soil shows that the use of 600 pounds of 7-4-0 per acre to cotton planted continously has resulted in the largest yield. The use of 24 pounds of P_2O_5 and bur clover led to the second largest cotton yield. Thirty-two pounds of nitrogen applied on corn in a two-year rotation with cotton that received 24 pounds of P_2O_5 annually produced 9.6 bushels of corn more per acre than the corn in the unfertilized rotation.

At Harrisonburg, in a two-year rotation with corn and soybeans on Ouachita river bottom soil, cotton following a cover crop of bur clover and receiving 600 pounds of 7-4-0 produced slightly higher yields than cotton planted continuously with an annual application of 600 pounds of 7-4-0. However, both treatments produced much higher yields than cotton grown continuously without fertilizer. The application of 600 pounds of 7-4-0 annually to corn and beans in a two-year rotation with cotton which received the same fertilizer treatment produced 13.9 bushels of corn more per acre than corn and beans grown continuously without fertilizer.

Cotton variety tests were conducted on the Coastal Plain soils of Lincoln and St. Helena Parishes. In Lincoln Parish the Deltapine 11A and Deltapine 14 produced the most profitable yields. The Stoneville 5A and Deltapine 14 were most profitable in St. Helena Parish.

A corn variety and hybrid experiment conducted on Coastal Plain soil at Simsboro shows that the Louisiana corn hybrids numbers 496 and 420 were the highest producers and the Jarvis and Hastings Prolific were the highest producing open-pollinated varieties.

In a soybean variety test in West Carroll Parish the Ogden and Palmetto produced the largest seed yields.

The Use of Winter Legumes as Green Manures Improves Soil Fertility . . . F. L. Davis

The use of winter legumes as green manures not only increases the yield of the crop immediately following but also improves soil fertility to an extent that can be measured by increased crop yields for two or more successive years. Experiments with winter cover crops conducted since 1930 on the Louisiana State University farm have provided data on the amount of green matter produced by different crops, their contents of nitrogen, and the effect of the green manures on the yields of the following crops for two or more years.

Recommended Winter Legume Crops

The winter legumes that have been successfully grown are Austrian winter peas (*Pisum arvense*), sour clover (*Melilotus indica*), hairy vetch (*Vicia villosa*), common vetch (*Vicia sativa*), Hungarian vetch (*Vicia*

pannonica), bur clover (*Medicago arabica*), and Singletary pea (*Lathyrus pusillus*). With the exception of sour clover, these legumes are all adapted to the soils and climate of the whole state. Sour clover, or Melilotus as it is also called, is adapted to the nearly neutral soils of the Red and Mississippi River bottom land, but can be grown on other fertile soils if they are nearly neutral in reaction.

Amount of Green Growth Needed for Green Manures

The experiments have shown that to be successful as green manures a winter legume should make a growth of $3\frac{1}{2}$ to 4 tons or more of green matter per acre at the time it is turned under. The data showed that when quantities of $3\frac{1}{2}$ to 3 tons or less of green matter per acre were turned under that the money spent for seed did not produce as profitable returns as did the same amount of money expended for commercial inorganic nitrogen fertilizers.

Nitrogen Content of Green Leguminous Matter

Numerous laboratory analyses of leguminous green matter have shown that it contains from 10 to 14 pounds, and may contain as much as 16 pounds, of nitrogen per ton of green material. Consequently, plowing under a growth of only 4 tons of green matter per acre incorporates from 40 to 60 pounds of organic nitrogen into the soil and a tonnage of 6 tons or more could contain 100 pounds or more of nitrogen. Such tonnages of green manures markedly increase the yield of subsequent crops during favorable seasons if the needs of the crops for the mineral nutrients, phosphate and potash, have been supplied.

Effect of Green Manures on the Yield of Cotton

In all the experiments conducted four tons or more of leguminous green manures have given increases in the yield of cotton equal to or greater than that obtained from 36 pounds of nitrogen per acre supplied by applications of nitrate of soda. The non-leguminous green manures, rye and oats, did not appreciably increase the yield of cotton. In one test on Lintonia silt loam at Baton Rouge the 4-year average increases in the yield of cotton the first year after turning under an average green growth of 5.4 and 6.0 tons per acre of Austrian winter peas and hairy vetch were 570 and 573 pounds of seed cotton per acre. The average increase obtained from 36 pounds of nitrogen per acre from nitrate of soda was 469 pounds of seed cotton.

Residual Effect of Green Manure Crops

In this same test, the average increases in yield obtained on alternate years when no legumes were turned under and no nitrate of soda was applied amounted to 240 and 247 pounds of seed cotton per acre as a residual effect from the Austrian winter peas and hairyvetch and 87

pounds of cotton from the nitrate of soda. The accompanying table "Growth of green matter and effect of green manures on the yield of cotton on Olivier silt loam" gives a summary of the data on the test being carried on at the present time.

GREEN MATTER GROWTH AND EFFECT OF GREEN MANURES ON THE YIELD OF COTTON ON OLIVIER SILT LOAM AT BATON ROUGE

Plot No.	WINTER CROP COVER	/Fertilizer applied to cotton 600 lbs.	AV. GREEN MATTER PER ACRE IN 1940 and 1942		FIRST YEAR EFFECT ON COTTON 1940 AND 1942		RESIDUAL EFFECT SECOND YEAR 1941 AND 1943	
			Tons	Lbs. N	Yield Lbs.	Increase Lbs.	Yield Lbs.	Increase Lbs.
1	No cover crop—check	0–8–4	....	....	748	....	599	....
2	Nitrate of soda—*check	6*–8–4	....	(36)*	1108	360	751	152
3	Hairy vetch	0–8–4	5.1	62.9	1282	534	813	214
4	Austrian winter peas	0–8–4	5.1	58.0	1184	436	845	246
5	Bur clover	0–8–4	5.8	56.3	1275	527	918	319
6	Lathyrus pusillus	0–8–4	4.1	49.7	1217	469	849	250
7	Oats and nitrate of soda*	6*–8–4	6.9	34.3	1077	329	844	245

*Nitrate of soda was applied n 1940 and 1942 only.

Cotton following oats (left) and Austrian winter peas (right). Yield following oats: 731 pounds seed cotton per acre. Yield following peas: 1,322 pounds seed cotton per acre.

Corn Yields Can Be Increased . . . F. L. Davis

The expansion of diversified farming and an increase in the production of livestock are dependent upon the production of adequate quantities of feed and feed crops. Corn is one of the important feeds of most livestock. The average acreage of corn in Louisiana for the ten-year period, 1930-1939, was 1,479.000 acres—a larger acreage than that of any other cultivated crop—and the average yield for the State was 14.4 bushels per acre. Experiments conducted by the Agricultural Experiment Station show that these yields can be improved by the use of soil-building legumes and proper fertilization.

In a rotation-soil fertility experiment conducted for five years on an Olivier silt loam at Baton Rouge, average annual yields of forty bushels of corn per acre have been obtained from two different treatments. In a rotation of corn and soybeans with cotton in which the cotton is fertilized with 600 pounds per acre of a 6-8-4 fertilizer, an average yield of 38.9 bushels of corn per acre has been obtained by side-dressing the corn with nitrate of soda at the rate of 30 pounds of nitrogen per acre. This was an average increase of 8.9 bushels of corn per acre at a cost for fertilizer materials of about 42 cents per bushel of corn. Where corn and soybeans have been grown continuously, an annual application of 300 pounds per acre of a 6-8-4 fertilizer has produced an average of 41.2 bushels per acre at a cost for fertilizer materials of about 27 cents per bushel of corn.

On another test on more fertile soil on which three successive crops of winter legumes had been turned under in 1938, 1939, and 1940, yields of 35 to 50 bushels of corn were obtained. As an average of two years, 1942 and 1943, where 75 pounds of nitrate of soda were applied, the addition of 100 pounds per acre of 20% superphosphate produced 44.8 bushels, or an increase of 7.4 bushels per acre. This increase was obtained at a cost for superphosphate of about 16 cents per bushel. The 2-year average yield of all plots receiving 200 pounds per acre of a 6-10-7 fertilizer was 47.4 bushels per acre or an increase of 8.5 bushels of corn per acre from the fertilizer. This increase was obtained at a cost for fertilizer materials of about 39 cents per bushel. The complete results of these tests are reported in the Annual Preliminary Report of the Department of Crops and Soils.

Fertilizer For Rice in Southwest Louisiana . . .

R. K. Walker and M. B. Sturgis

In addition to the fertilizer work at the Rice Experiment Station, four outfield tests are being conducted in different parts of the rice area in Southwest Louisiana. During 1943 special effort was made to cut down the size of the plots and to increase the replications. This was found to

be possible through the use of the combine-harvester which proved very satisfactory.

A summary of the data from 18 different experiments widely scattered through the rice area and conducted through a period of one to six years shows that in 13 out of 18 experiments the fertilization of rice was definitely profitable. An average increase of 474 pounds of rough rice per acre for each 200 pounds of fertilizer used was obtained. The 8-10-7, 6-12-6, 4-10-7, 0-12-6, and 0-10-7 grades gave the best results. The 8-10-7, 6-12-6, and 4-10-7 grades were more widely adapted. The 0-10-7 and 0-12-6 grades were found to be better adapted to the darker and mucky soils and to the moundy areas where the subsoils are calcareous.

The practical application of the results obtained in this work is concerned with the establishment of better practices in the use of fertilizer in the rice area. The rice crop of Louisiana could be increased approximately 10 per cent by having the farmers accept the recommendations of the Experiment Station on the use of fertilizers. The increase could be obtained without any further cost to the farmers. The crop could be increased 20 per cent through the expenditure of $2.00 an acre more for fertilizer than is being expended at the present time.

The method of applying fertilizer to rice is extremely important. Recent research work indicates that better results might be had by applying the fertilizer below the seed at planting time and also it shows the absolute necessity for weed control if the best results are to be had from the use of fertilizer.

Pasture-Rice Rotation Experiments . . .

R. K. Walker and M. B. Sturgis

Four pasture-rice rotation experiments were conducted through 1943. The purpose of these experiments is to determine the conditions necessary to establish profitable pastures on the coastal prairie soils of the rice area and to improve the soil by rotating improved pasture with rice.

A summary of the beef production on the different pastures and from various treatments is given in the following table. The yield of beef over a three-year period on the check pastures which were mowed only varied from 25 to 75 pounds per acre annually. The improved pastures produced from 145 to 220 pounds of beef per acre annually. The average annual cost for establishing and maintaining improved pastures varied from $7.00 to $8.50 per acre. This estimate of cost is based on a three-year period. If the pastures are maintained for longer periods the cost would be much less.

It is now apparent from this work that the best pasture mixture consists of white clover, lespedeza, and Dallis grass or Bermuda grass. Supplemen-

tal meadows or pastures of lespedeza or Dallis grass or lespedeza and Dallis grass should be planted. Supplemental pastures are especially important where dense stands of under-grazed clover are obtained. The 3-12-12 and 4-12-8 are the most generally adapted fertilizers for the establishment of pastures. The 0-12-12 and 0-14-7 should be used for applications to old pastures. Soils more acid than pH 6.0 should be limed.

GRAZING DATA FOR 1943 FROM PASTURES IN PASTURE-RICE ROTATION EXPERIMENTS

Location	TREATMENTS	Grazing Period	Average production of beef per acre per day
A. R. McBurney, 15 mi. N. of Welsh	Check, mowed	189 days	0.28
	Seeded, and mowed	189 days	0.46
	Seeded, mowed, and 400 pounds per acre 4-12-8	189 days	0.69
	Seeded, mowed, 400 lbs. per acre 4-12-8, 1.5 Tons Limestone	189 days	0.79
T. H. Mayes 5 mi. S. of Kinder	Check, mowed	189 days	0.12
	Seeded, mowed	189 days	0.15
	Seeded, mowed, 400 lbs. per acre 3-12-6	189 days	0.44
	Seeded, mowed, 400 lbs. per acre 3-12-6, 1.5 Tons Limestone	189 days	0.75
J. F. Noel, 5 mi. S. of Abbeville	Check, mowed	240 days	0.32
	Seeded, mowed	240 days	0.42
	Seeded, mowed, 400 lbs. per acre 0-12-6	240 days	0.72
	Seeded, mowed, 400 lbs. per acre 3-12-6, 1 Ton Limestone	240 days	0.89
Lozen Leger 2 mi. S. of Rayne	Check, mowed	100 days*	0.40
	Seeded, mowed	100 days	0.40
	Seeded, mowed, 400 pounds per acre 3-12-12	100 days	0.89
	Seeded, mowed, 400 pounds per acre 3-12-12, 1 Ton Limestone	100 days	0.45

*This was a new pasture seeded in February, 1943; others are 2 and 3 years old.

Fertilizer Experiments with Sugar Cane . . .

C. B. Gouaux, M. B. Sturgis, and R. K. Walker

Soil fertility studies, published in Proc. Soil Sci. Amer. 6:344-347. 1941, have shown that the soils on the Mississippi terraces within the sugar cane area are variable in their contents of nutrient constituents. The variations are high within soils of the same series as well as between soils of different series. This indicates that several different fertilizers would be required to judiciously fertilize sugar cane in the area.

A summary of results from field experiments at 15 different locations are given in the following table. It can be seen from the results that the 12-8-12 (or 9-6-9) was the most widely adapted fertilizer used. This was followed in order as given by 12-0-12 (or 10-0-10), 12-8-0 and nitrogen only. The experiments have not been conducted long enough or extensively enough to be fully conclusive. They do show, however, that profitable results could be expected from the application of 400 pounds per acre 9-6-9 fertilizer where the available soil phosphorus and potassium are low, from the application of 400 pounds of 10-0-10 where the available potassium is low, from the application of 300-400 pounds of 12-8-0 or 10-6-4 where the available phosphorus is low and from the application of 36-40 pounds of nitrogen in any of the common carriers where the available soil phosphorus and potassium are not deficient.

The levels of the availability of phosphorus and potassium may be estimated for individual fields by sending correctly taken soil samples from each field to the Louisiana State University Soils Laboratory for analysis and recommendations.

Summary of Fertilizer Tests on Sugar Cane for 1942 and 1943 on Mississippi Terrace Soils

Location	Soil Type	Year and Age of planting	Pounds Sugar per acre with no fertilizer	Pounds Sugar per acre with 36 lbs. of Nitrogen	Pounds Sugar per acre with 300 lbs. best adapted mixed fertilizer used	Best adapted fertilizer used
J. W. Wyche, New Iberia	Olivier silt loam	1942 First Stubble	3273	5291	5721	12-0-12
R. J. Landry, Jeanerette	Olivier silt loam	1942 First Stubble	4202	6416	6225	Nitrogen
C. Willis Roy, Opelousas	Olivier silt loam	1942 First Stubble	1743	1967	2674	12-8-0
Orange Grove, New Iberia	Olivier silt loam	1943 Plant cane	4293	4281	4907	12-8-12
A. Ste Marie, Broussard	Lintonia silt loam	1942 First Stubble	3266	3382	4211	12-0-12
Oasis, Cade	Lintonia silt loam	1943 First Stubble	4713	5268	5557	12-0-12
A. Ste Marie, Broussard	Lintonia silt loam	1943 First Stubble	3824	5199	5600	12-0-12
Avenelle Landry, Erath	Iberia silt loam	1942 Plant cane	5146	4957	5687	12-8-12
J. L. Kling, New Iberia	Iberia silt loam	1942 First Stubble	1187	1387	1788	12-8-0
Jeff Bienvenue, St. Martinville	Iberia silt loam	1942 First Stubble	3167	4883	4999	12-8-0
Caroline, New Iberia	Iberia silty clay	1942 First Stubble	3634	4070	5060	12-8-12
Avenelle Landry, Erath	Iberia silt loam	1943 First Stubble	3492	3268	4458	12-8-12
H. Gonsoulin, Jeanerette	Iberia silt loam	1943 Plant cane	5462	5929	6876	12-8-12
J. L. Kling, Loreauville	Yazoo silty clay loam	1943 First Stubble	4436	5453	5681	12-0-12
Cedar Grove, Labadieville	Yazoo silt loam	1942 First Stubble	3030	3134	3946	12-8-12

Dairy Research

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Dairy Pasture Experimental Results . . .

D. M. Seath and L. L. Rusoff

Pasture out-yields Corn Crop

Experimental areas[1] in Washington Parish for 1943 produced nutrients in the form of pasture which exceeded by several times the average nutrients produced from a corn crop. The dairy pasture experiments were conducted on the farms of B. P. Alford, Mt. Hermon and H. N. McEwen, Bogalusa.

The yield of pasture herbage from the Alford experiment averaged 3.25 tons of air-dry herbage per acre. When converted to digestible nutrients this was equivalent to approximately 64 bushels of corn (in shuck) per acre. McEwen's best experimental pasture produced 4.84 tons of air-dry herbage per acre, equivalent to 95 bushels of corn per acre. A native unimproved pasture on the McEwen farm produced only 1.54 tons of air-dry herbage, equivalent to approximately 30.3 bushels of corn per acre. At present corn prices ($1.30 per bu.) the best McEwen pasture produced nutrients worth $84.11 per acre more than the unimproved pasture.

Less labor and harvesting costs favor the improved-pasture method of producing feed nutrients over the corn-production method. These factors plus the greatly added returns are accelerating the trend toward more improved pastures.

Long-time Pasture Improvement Pays Dividends

A dairy pasture experiment on the B. P. Alford farm[1] near Mt. Hermon, Louisiana gave evidence that permanent pastures continue to improve from year to year as a result of proper fertilization and good management. Records on this experiment for 1943 showed that a pasture receiving fertilization periodically over seven years gave returns approxi-

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[1]Consisted of terrace soils. The Soil Conservation Service identified Alford areas as largely Paden very fine sandy loam and Cahaba fine sandy loam and the McEwen area as Paden very fine sandy loam, Kalmia fine sandy loam and Stough very fine sandy loam.

mately 50 per cent greater than one receiving similar treatment for only three years.

The results follow:

	East Pasture (Fertilized for 3 years)	West Pasture (Fertilized for 7 years)	Increase	
			Amount	Percent
Days grazed	107	151	44	41
Cow days per acre	264	367	103	39
Lbs. milk per acre	4504	6712	2208	49
Milk value @ $3.50 cwt	$158	$235	$ 77	49
Value of grain supplement fed	28	40	12	43
Return over grain fed per acre	130	195	65	50

Grazing secured for 1943 was the greatest of any year during the experiment. Cattle started grazing on February 6th and were one one of the two pastures continuously until October 21st. The Alford pasture was completely renovated, including breaking of the sod and fertilizing with lime, phosphorus, and potash (one-half of area) in the fall of 1941. The present experiment calls for renovating portions of the pasture completely at two-, four-, and six-year periods and comparing results.

Limed Pasture Proves Best

Lime in the form of paper mill sludge, a waste product, has given highly beneficial results in a pasture test on the H. N. McEwen farm[1] north of Bogalusa. The longer the test is continued the more noticeable are the beneficial effects from the lime applied. In 1940-41 the lime was applied at the rate of three tons per acre. In 1942 there was little difference noted between areas limed and those not limed, but in 1943 the story changed. More clover and more grazing were furnished from the limed areas. The yield of air-dry herbage averaged 4.84 tons, while from the unlimed pasture it was only 4.03 tons. This was a 20% increase. Likewise, the protein content of the herbage increased 9.4% and the calcium or lime by 78%. Grazing records for 1943 showed the per acre value of the milk produced from cows grazing the limed pasture was $107.80 after deducting cost of grain fed to cows as a supplement. On the same basis the unlimed pasture returned only $75.32 per acre.

Lime Gives Big Boost to Lespedeza

Lime as a fertilizer proved unusually beneficial in increasing the yield of lespedeza hay in a test during 1943 on the J. Ruffin Packer farm[2] near Leesville. Likewise, phosphorus and potash fertilizers were found beneficial.

[2] Soils were classified by Soil Conservation Service as belonging to Forrested Coastal Plains general group with the Tenny area varying from good grade Bowie to Ruston fine sandy loam with heavy subsoil and the Packer area largely Tabor fine sandy loam with a little Ruston very fine sandy loam.

The results, in brief, showed that:

1. Phosphorus exceeded no treatment by 0.30 tons of hay or 51%.

2. Phosphorus plus potash exceeded no treatment by 0.37 tons or 67%.

3. Phosphorus plus potash plus lime produced yields excelling those from no treatment by 0.95 tons or 173%.

4. Disking or plowing and disking, as seed bed preparation procedures, proved superior to no preparation or only harrowing.

5. The protein and calcium contents of the herbage were both relatively low from the untreated plots, but showed marked increases on plots fertilized.

Manure and Commercial Fertilizer Help Lespedeza

Dairy pasture tests on the Fred Tenney farm near DeRidder showed that lime, phosphorus, potash, and barnyard manure all help to increase yields from lespedeza. The yields of herbage were the highest where all these fertilizers were used. Their use also increased the protein and mineral content of the lespedeza.

While potash proved beneficial in this test for the first year, its use did not prove to be very necessary where manure had been applied. It was also shown that manure alone produced yields comparable to phosphate fertilizer alone. The treatment of lime, phosphate, and manure averaged 2.03 tons of air-dry herbage per acre, an increase of 1.32 tons or 137% over no treatment. In terms of "pure" lespedeza hay (omitting grass and weeds) the increase over no treatment was 1.72 tons or 556%.

Chemical analyses showed protein, calcium, and phosphorus to be extremely low in herbage from unfertilized areas with increases ranging from 50 to 200% in herbage from areas fertilized.

Hay Production at Hammond Station . . .

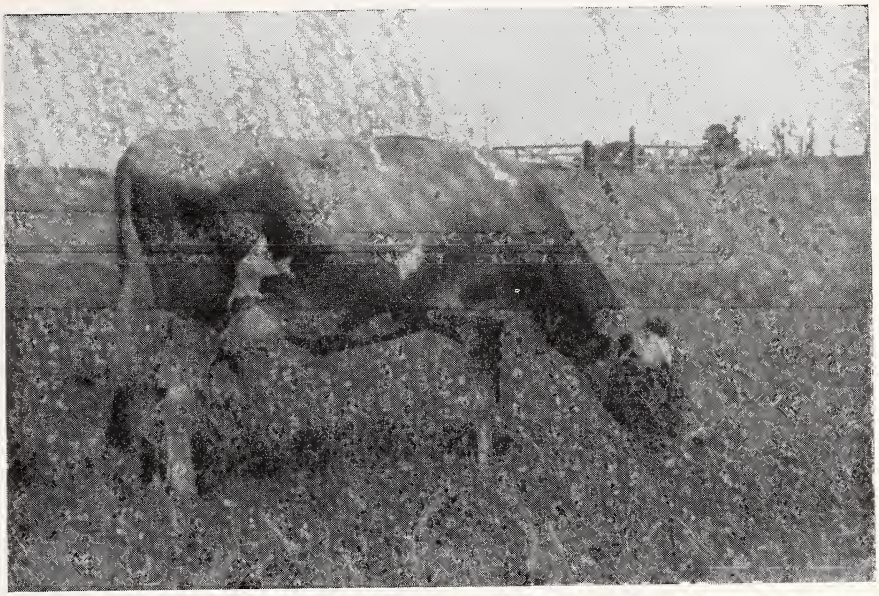
D. M. Seath and W. F. Wilson, Jr.

Potash Proves Beneficial

During the last 12 years experiments have been conducted on the Hammond sandy loam at the Fruit and Truck Experiment Station in an effort to determine best soil treatments and renovation procedures to follow so as to produce the most feed nutrients in the form of hay or pasture. Data secured in 1943 showed a significant improvement in the stand and yields of clovers and Dallis grass resulting from potash fertilizer applied in October of 1941. The best yields were secured from areas treated in 1941 with one ton of lime, 48 units of phosphorus (P_2O_5), and 48 units of potash (K_2O) per acre. Plots receiving this treatment yielded 3,476 pounds of air-dry hay per acre, or 13.8% more than plots receiving all treatments other than potash.

Lespedeza experimental plots yielded an average of 3,400 pounds of air-dry hay per acre. Highest yields were secured from areas receiving 1000 pounds of basic slag and 150 pounds of 48% muriate of potash per acre, and averaged 4,170 pounds of hay per acre. Plots receiving potash increased in yield by 1230 pounds of hay or 44% more than plots not treated with potash.

The beneficial effect of potash on clovers, Dallis grass, and Lespedeza was also shown in 1942.



A good cow and good pasture go well together. Above is shown a first-calf heifer on improved permanent pasture at the North Louisiana Experiment Station.

Dairy Work at Calhoun . . .

D. M. Seath and D. M. Johns

High Herd Average with Good Roughage

During 1943 the experimental herd averaged 14.2 milk cows and produced 8,230 pounds of milk and 358 pounds of butterfat per cow. This is more than three times the production of the average Louisiana milk cow. The providing of improved permanent pasture plus oats and Sudan as temporary pasture, and silage and hay for winter feeding, made it possible to secure high production on a low rate of grain feeding.

Kudzu vs. Bermuda Hay

A hay-feeding trial comparing kudzu and Bermuda hay gave results similar to those secured in 1942. The eight experimental cows averaged 18.4 pounds of milk per day while on kudzu hay and 17.7 pounds while

on Bermuda hay. Body-weight changes showed a loss averaging 8 pounds per cow (for 21 days) while on kudzu and a gain of 12 pounds per cow while on Bermuda hay. The above results would indicate no significant differences between the two kinds of hay. The net consumption data, however, did show significant differences. The cows consumed an average of 8.7 pounds of kudzu hay per day and refused (mostly stems) 9.6 pounds. With Bermuda hay the average consumption was 10.8 pounds and the refusal 3.7 pounds. In both cases the cows were allowed to consume all the hay they wanted. In addition to hay the cows received silage and a simple grain mixture.

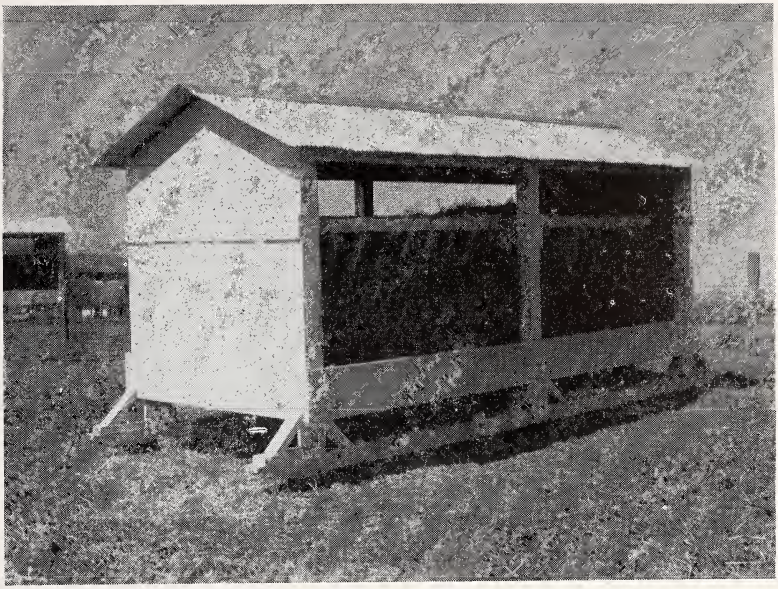
A close-up view of alyce clover hay. This legume hay retains its leaves very well, is high in carotene (vitamin A), relatively high in protein, making it an excellent feed for dairy cattle.

Alyce Hay is Equal to Lespedeza Hay . . .

Cecil Branton, D. M. Seath and L. L. Rusoff

A second experiment has shown that aylce clover hay is equal to lespedeza hay of approximately the same quality in the feeding of milking cows.[3] The chemical analyses of the two feeds showed that the alyce clover hay contained approximately $2\frac{1}{2}$ per cent more protein than did the lespedeza hay; yet, milk yields and body-weight changes showed no significant differences between the two feeds. Carotene analyses of the two kinds of hay showed alyce to contain approximately 50 per cent more

[3] A report of the first trial is given in the Station's report for 1942.



A practical hay-feeding rack with cover is shown above. This was used in alyce vs. lespedeza hay experiment. Below is shown one group of experimental cows about to receive their alyce clover hay.

carotene than lespedeza. This difference was also reflected in the vitamin A content of the milks.[4]

Twenty cows were divided into two groups and fed alternately for three 21-day periods on the two kinds of hay. An average of 13 pounds of hay per cow of each variety was consumed daily; yet, that wasted or refused averaged 1.6 pounds for alyce and only 1.1 pounds for lespedeza. The longer and coarser stems of the alyce hay contributed toward this greater loss from refusal and wastage around the hay-feeding racks.

Relatively high production was secured by the 16 Holstein and 4 Jersey cows used in this experiment with yields of 4 per cent equivalent milk averaging 25.0 pounds per cow daily while on alyce hay and 24.9 pounds while on lespedeza. In each case the cows were fed corn and soybean silage at the rate of 3 per cent of body weight daily and a simple concentrate mixture consisting of either three parts corn or three parts dehydrated sweet potato meal mixed with one part of cottonseed meal plus 1 per cent each of salt, special process steamed bone meal, and oyster shell flour. This grain mixture was fed on an equitable basis as shown by each cow's production and body weight.

Dehydrated Sweet Potatoes—A Good Feed . . .

D. M. Seath, Cecil Branton and L. L. Rusoff

A feeding trial has again demonstrated that dehydrated sweet potatoes make a valuable addition to a dairy cow's concentrate ration.[5] These findings would indicate a greatly expanded usage of this feed following the War, when human demands for this dried product will probably diminish.

The commercially dried potatoes used in this experiment were of the Porto Rico variety. The product proved to be very palatable, and readily eaten by all cows. The concentrate ration consisted of three parts by weight of dehydrated sweet potato meal and one part of cottonseed meal. To this was added one per cent each of salt, special process steamed bone meal, and oyster shell flour. A second concentrate ration which was compared to the one containing sweet potatoes was the same except that ground corn (including cob and shuck) replaced the sweet potato. Adjustment was made in the corn concentrate ration so that 20 per cent more corn but the same amount of cottonseed meal were fed as in the sweet potato ration. This was done in an effort to help compensate for the extra bulk in the form of cob and shuck found in the corn mixture. As evidence of this bulk, 50 ears selected at random were found to consist by weight of 70.8 per cent shelled corn, 15.9 per cent cob, and 13.3 per cent shuck.

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[4] Vitamin analyses of the milks were determined by the Nutrition Laboratory.
[5] Last year's Station Report gives results from a similar experiment.

Milk yields based on a 4 per cent equivalent basis were almost identical on the two rations, i.e., 24.9 pounds per cow daily on sweet potatoes and 25.0 pounds on the corn mixture. Body weight changes of the 16 Holsteins and 4 Jerseys used in the experiment were almost identical. Taking into consideration age, stage of lactation, past and current production, the cattle were first divided into two approximately equal groups. Each group was then alternated from one ration to the other as per the double-reversal plan. In general, they liked the sweet potato ration better than they did the more bulky corn ration, which included the cob and shuck. This was a partial reflection of the chemical analyses of the two rations which showed slightly less than one-half the fiber in the sweet potato mixture as in the corn mixture. On the other hand, the corn ration contained slightly more protein.

This year's experiment would indicate that 1.0 pound of sweet potato meal is approximately equal to 1.2 pounds of ground corn (including cob and shuck) when fed in combination with cottonseed meal to cows receiving a legume hay and corn-soybean silage.

The high carotene content of the sweet potatoes increased the vitamin A content of the milk approximately 20 per cent over the milk from cows fed corn.

Simple Grain Ration Gives Good Results . . .

Cecil Branton and D. M. Seath

One double-reversal feeding trial designed to determine whether a complex grain mixture gives better results than a more simple one was completed during the year. The trial was conducted during the months of May, June and July, at which time the 28 experimental cows had access to fairly good permanent pasture. The trial was conducted for three 28-day periods, the first seven days of each period being used as the transition or preliminary period.

The concentrate rations were as follows:

*Simple Ration**	*Complex Ration**
300 lbs. ground yellow corn	500 lbs. ground yellow corn
100 lbs. cottonseed meal	200 lbs. wheat bran
	100 lbs. ground oats
	100 lbs. cottonseed meal
	100 lbs. soybean meal

* Each ration included 1% salt, 1% bonemeal, and 1% oyster shell flour.

These rations were comparable in amounts of digestible nutrients. Each cow was fed at the rate of 7 pounds of grain mixture to 1 pound of butterfat.

Daily milk and butterfat production records were kept. Each cow was weighed at the beginning and ending of each of the three periods.

Results of the trial showed that one group of 14 cows produced the most milk and butterfat on the complex rations. The other 14 cows had the highest production on the simple ration. When the two groups were combined the results were identical, i.e., 28.5 pounds of milk and 1.06 pounds of butterfat per cow per day. Liveweight changes gave no significant advantage to either ration.

Present plans call for conducting other similar trials under various pasture- and winter-feeding conditions.

Mineral Deficiencies of Louisiana Dairy Herds . . .

L. L. Rusoff and D. M. Seath

Forage samples obtained from various soil types throughout the state have been analyzed for percentage of ash, calcium, and phosphorus. In general, a low percentage of these minerals was found in the forage grown on unfertilized upland soils, and on some fertilized soils. The lowest value found for calcium was 0.17% and phosphorous 0.07%.

A controlled experiment involving typical milking cows and dairy heifers obtained from the Florida parishes is in progress. Fifteen animals, five of which are milking cows, are divided into five groups. The basal grain ration consists of cottonseed meal or blood meal, cracked corn, and

Two of the lactating animals on the mineral-deficiency experiment.

salt. Hay grown on a non-fertilized pasture, which is extremely low in percentage of calcium and phosphorous, is the source of roughage. One group receives the basal ration; the other groups receive the basal ration supplemented with oyster shell flour (calcium), or mono sodium phosphate (phosphorous), or bonemeal (calcium and phosphorous).

Live weights, hemoglobin, and blood calcium and inorganic phosphorous values of the blood plasma are determined monthly. Milk production and percentage fat are also recorded. As yet, no significant results have been obtained.

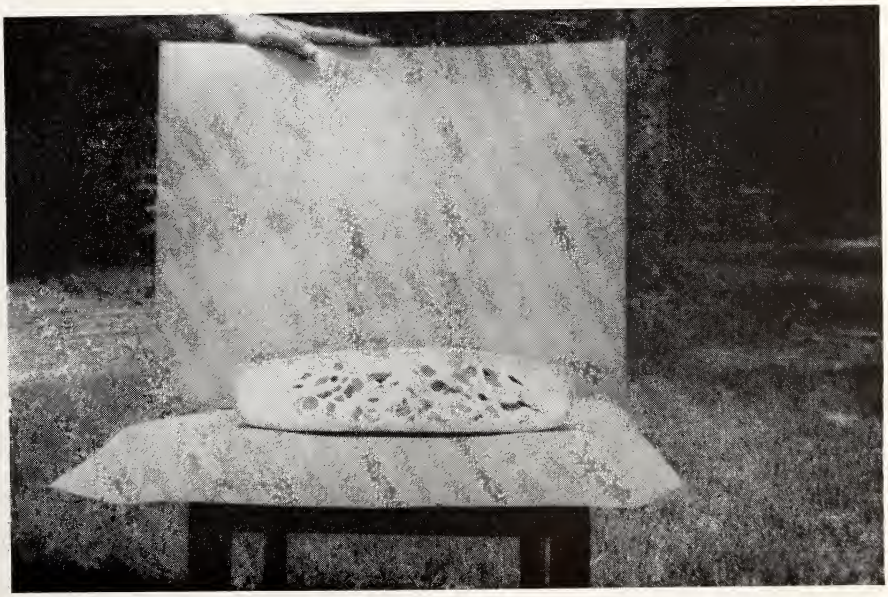
The hemoglobin content, calcium and inorganic phosphorous values of the blood of cows in the University dairy herd are being determined monthly so as to establish a normal value for these minerals.

Report on Development of New Cheese Varieties . . .

J. A. Prichard and A. J. Gelpi

The cheese research now in progress is involved with three types of cheese, namely, Cheddar, small-type Swiss, and an Italian variety called Sbrinz.

From results obtained after eight weeks curing, it appears that by a modified short-time method one can produce a Cheddar cheese that cures more rapidly at 40°F. than cheese made by the conventional method.



A small-type Swiss Cheese showing desirable eye formation. One of many being made experimentally in preparation for post-war surplus milk.

However, when the cheese is cured at 54°F. instead of 40°F. the fermentation or curing changes occur too rapidly. More complete results will be obtained after 24 weeks curing.

The work with small-type Swiss involves a comparison of the use of 5% fat milk with 3.5% fat milk. Heretofore, this cheese has been produced only from low fat milk such as is produced so generally in the cheese producing areas. Also, an attempt is being made to mold this cheese into smaller sizes than the conventional Swiss in order to facilitate retail marketing.

Considerable interest has been shown in some of the Italian varieties by the cheese jobbers and wholesalers in the New Orleans area. The work with these varieties is in its beginning and first involves learning to make these varieties. From the standpoint of the Louisiana dairyman, the chief advantages of these Italian varieties are: (1) the fact that there is a demand for these varieties in the South which is met by importations from Italy during peace times and since the beginning of the war from the Argentine Republic and (2) the price paid the producer for milk to be used in these types of cheese is higher than the price paid for milk manufactured into Cheddar cheese.

Artificial Breeding of Dairy Cows . . .

D. M. Seath, Cecil Branton and A. H. Groth

Artificial insemination has been defined as the deposit of male germ cells in the female reproductive tract by mechanical means rather than by direct service of a male. A project studying its use has been conducted by the Dairy Research and Veterinary Science Departments of the Louisiana Agricultural Experiment Station since April, 1943. To date, however, only one bull has been used. This bull is a Three-Star Jersey bull about three years of age. The project has been conducted only long enough to accumulate preliminary data.

The average volume of semen collected from the bull for the months of April through September of 1943 was 2.35 ml. for the first service and 3.23 ml. for the second service. These samples were diluted at the rate of 1 part by volume of semen to 4 or 5 parts of an egg-yolk citrate buffer. This diluting material improves the keeping quality of the semen and multiplies the number of cows that can be bred from each service. These samples were all given microscopic examinations for concentration and motility of the sperm. All samples were kept at a temperate of 40 to 50°F. Considerable motility has been found in most instances in 4- and 5-day-old samples and some motility was found in one 13-day-old sample. The practice has been to use semen samples for insemination that were less than four days old. In most cases, if possible, fresh samples have been used.

Results from this artificial breeding project definitely indicate the necessity of using high quality semen. When the bull in use produced such semen more than 65 per cent of the cows were successfully bred with one insemination. On the other hand, a low quality semen sample often failed to settle any cows. The bull in use varied much from time to time in the concentration, motility, and fertilizing ability of his semen. This indicates that any artificial breeding unit must plan to have two or more bulls of each breed that produce a high quality semen if it is to succeed. It appears essential that a well-trained operator who has knowledge of dairy cattle diseases, as well as techniques of artificial breeding, be placed in charge of the project. Results to date show that artificial breeding was not any more efficient than was natural breeding in impregnating hard-breeding cows.

Effect of Iodinated Casein When Fed to Milk Cows* . . .

D. M. Seath, Cecil Branton and A. H. Groth

Various forms of thyroid-stimulating compounds have been secured directly from the thyroid glands of slaughtered animals. Those compounds always contain iodine. Recently a process of combining iodine with casein of milk has been perfected with a resulting compound called "iodinated casein." This compound has proved to be more potent in stimulating the thyroid gland than have the compounds secured directly from thyroid glands.

Three trials have been conducted at Louisiana State University to determine the influence of feeding iodinated casein to lactating dairy cows. When fed at the approximate rate of 15 grams for 1000 pounds of live weight, the cows, with very few exceptions, have increased in their milk flow and in the percentage of butterfat. Three iodinated-casein fed cows in the first trial produced during the 8 weeks' test 3.4% more milk than during the preliminary period; whereas, the three cows in the check group were lower by 2.5%. In total butterfat yield the iodine group increased during the tset period by 12.9%, while the check group decreased by 2.9%. Similar results were secured in the two subsequent trials, but in all cases there was an acceleration of pulse rate and a more than normal loss in body weight by animals being fed iodinated casein. No significant effect on body temperature was detected. Some cows lost body weight much more than others. In the third trial an attempt was made to regulate the loss in body weight by varying the amounts of iodinated casein fed but inconclusive results were secured. Much more experimental work is necessary before the general use of iodinated casein can be recommended.

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* Iodinated casein was furnished for these experiments by Cerophyl Laboratories, Kansas City, Mo.

Entomology

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Dusting with Cryolite Proves A Successful Control for the Sugarcane Borer . . . A. L. Dugas

A number of recommendations for the control of the sugarcane borer, the most destructive insect pest of sugarcane in Louisiana, have resulted from extensive research by various workers since 1890; however, it was only in 1943 that definite recommendations were released for combating this pest by the use of an insecticide. Through the cooperative efforts of the Louisiana Experiment Station and the U.S.D.A., in very extensive experiments conducted from 1937 through 1942, cryolite was found to be highly effective against the borer.

In 1942, the Louisiana Experiment Station conducted eight small plot tests to determine the savings in yield of cane and of sugar resulting from cryolite control. In these tests the excessive damage to cane by the borer and the effectiveness of cryolite as a control were clearly demonstrated. As a result, in 1943 about 10,000 acres of cane were treated with cryolite to combat the borer. This undertaking enabled us to establish the experimental findings on a sound practical basis in conjunction with other recommendations, as well as to study many phases of the dusting upon which data on a field scale were needed.

Increases in Yield of Cane of 2 to 10 Tons Per Acre and of 20 to 30 Pounds of Sugar Per Ton of Cane Resulted from Cryolite Control of Borers

After determining that cryolite was highly effective against the borer, resulting in a 90 to 99 percent control of first generation borers and a better than 50 percent control of the second generation from four applications of dust at weekly intervals, there appeared to be a need for data on savings in yield of cane and of sugar from the control of borers by this practice. Eight small-plot tests, involving four different varieties of cane were conducted to determine the gains in yields to be expected from borer control by dusting.

The value of cryolite as an insecticide against the borer as well as the economics of controlling borers were demonstrated beyond doubt. Straight cryolite again proved superior to diluted cryolite, and accounted for increases in yields of 2 to 10 tons per acre, and in sugar from 20 to 30

pounds per ton of cane. It became evident that second generation damage, occurring from about June 15 to July 15, in the lower seven or eight joints constitutes the principal damage by borers.

On a Practical Field Basis Cryolite Dusting to Control Borers Proved Beneficial and Eliminated Reinfestation

A thorough study of the practical application of cryolite dusting on about 8,000 acres showed it to be a practical and economical control for this pest. It also revealed that the only way to eliminate damage from reinfestation is to treat all cane requiring treatment on any one place. In leaving infested cane untreated, the ultimate gains at harvesttime from the dusting may be reduced from 25 to 50 percent by reinfestation from the untreated area.

Infestation counts made a short time after the last dust application and again at harvesttime, provided sufficient evidence that reinfestation was negligible in an area of about 2,300 acres, all dusted for first generation control. Borer infestation in the heaviest infested area was reduced from nearly 50 percent of the joints bored at harvesttime in 1942, in undusted areas, to as low as 3 percent in 1943 in dusted cane.

First and Second Generation Dusting Are of About Equal Value When Each is Applied According to Recommendations

With the advantages and limitations of first and of second generation control taken into consideration in the practical application of dusting, there was found to be little difference in the harvesttime control from the two, except that large-scale first generation control seemed to result in a more thorough clean-up of borers in large fields. All evidence indicated a definite need and use for both in coping with various borer situations.

Cryolite May Be Applied by Plane, Ground Machine, or Handgun

Studies to determine the relative effectiveness and cost of different methods of cryolite application in sugarcane were included in the program of field control. In the case of either first or second generation dusting, extensive records showed that there was no significant difference in effectiveness of plane, ground machine, or handgun dusting. The average cost of ground machine dusting on several plantations amounted to about $5.00 per acre, including the cost of dust and the application, but not the wear and tear on tractors. Plane dusting averaged approximately $6.50 per acre. Considering the wear on machinery as against the many advantages of plane application, the difference in cost seems negligible. Various field men and plantation owners have deemed it impractical to dust more than 200 to 300 acres of cane by ground machine on any one place.

Both Synthetic and Natural Cryolite Showed High Toxicity to The Borer

In order to more accurately compare the relative toxicity of synthetic and natural cryolite, comparisons were made in small randomized plots. Three replicated experiments yielded almost identical results with both materials, indicating little or no difference in toxicity. However, the poor dusting quality of straight cryolite has been a limiting factor in its application, so the effectiveness of either type of cryolite on a field basis would depend upon the dusting properties.

A Build-up of The Sugarcane Aphid Followed Large Scale Dusting with Cryolite in 1943.

Although a very insignificant build-up of the sugarcane aphid had been noticed in experimental plots in some instances, never was the build-up of sufficient importance to cause any alarm. However, the increase in the population of this aphid, following the commercial dusting of large areas in 1943, appeared to warrant consideration, especially following second generation dusting.

On more than 5,000 acres of cane treated for first generation control, only two small areas totaling about twelve acres showed a noticeable increase in this aphid, with the leaf injury from aphid feeding disappearing after a short time. In contrast, nearly 2,000 acres of Co. 290 and C. P. 29-103 canes dusted for second generation control became heavily infested with aphids. Although heavy localized infestations appeared in various areas, there was a noticeable increase throughout the whole dusted area. Leaf damage to the variety Co. 290 was much more severe than in other varieties. Even under conditions of a very heavy infestation of aphids, there was apparently little or no decrease in yield of cane or sucrose. It should be pointed out, that this particular aphid has not been found to be a vector of Mosaic disease of sugarcane.

Though the 1943 season was quite favorable for aphid increase, and such may not occur regularly, the problem of aphid control in connection with cryolite dusting of sugarcane certainly justifies some attention.

Red Rot Disease and Borer Damage Closely Associated in Co. 290 Cane

A heavy red rot infection in bored Co. 290 cane was found throughout the Teche Area during the 1943 season. The writer and I. L. Forbes, Plant Pathologist, made a rather extensive examination of dusted and non-dusted fields of standing Co. 290 cane which revealed the presence of a substantial infection of red rot disease in the borer infested cane of the non-dusted areas, as compared to the almost complete absence of red rot in the healthy cane protected from borer injury by dusting with cryolite. The fact that borer punctures are avenues of entrance for the red

rot fungus and the equally important fact that the borer damage to growing cane predisposes the stalks to severe damage by red rot constitute sufficient argument for controlling the borer.

Complete borer control program includes cryolite dusting in addition to other recommendations included in accompanying chart.

Pine Compounds Check Peach Pests . . .

C. O. Eddy and Thos. P. Dutsch

The study of pine compounds in the control of the shot-hole borer and the lesser peach tree borer was continued during 1943. The results of the tests corroborated those obtained in previous preliminary experiments, that is, these two peach tree pests are effectively controlled by applications of either a 10-20% solution of Palustrex Sulphonate, or a 20% emulsified pine tar oil (70% tar oil, 10% Oleic acid and 20% potassium hydroxide), or a 20% miscible pine oil. Nicotine added to these preparations increased their potency and showed promise for them as a control for the greater peach tree borer which infests the base of the trees. These solutions were equally effective when applied as a spray and when rubbed on with a brush. Not only were the controls satisfactory, but these materials are gaining favor as healing agents for wounded areas of the trees.

Research on Alfalfa Promises Better Yields . . .

C. O. Eddy and Thos. P. Dutsch

The growing of alfalfa in Louisiana has been unsatisfactory because of factors that have been generally unknown. Observations made over a number of years indicate that insects are one of several factors involved. These insect pests include several species of caterpillars, grasshoppers, blister beetles, cucumber beetles, aphids, leafhoppers, the three-cornered alfalfa hopper or girdler, and several other species of lesser importance.

These insects are difficult to control because; (1) Some of them are of the leaf-eating kind thus requiring a stomach poison such as an arsenical or flourine compound, and (2) the entire plant of alfalfa is usually utilized by animals and poultry in different forms of feed, and to some extent by humans as vitamins, etc., therefore not permitting the use of harmful residue-forming insecticides on advanced stages of growth. Studies have shown, however, that when caterpillars are present in damaging numbers some relief is secured from applications of cryolite made soon after cuttings are made. This aids in reducing populations that infest the next growth of plants. Also it was found that a rotenone and sulphur combination dust is a fairly satisfactory control for the three-cornered alfalfa hopper or girdler, a species that is very destructive in some areas nearly every year.

Sweet Potato Weevil Control . . . C. O. Eddy, E. H. Floyd and K. L. Cockerham, Cooperating

Sweet potatoes in some of the principal commercial growing areas of Louisiana are often seriously damaged by an insect known by the common name of "Sweet potato weevil." This insect is controlled by farm sanitation and cultural practices ordinarily. However, these are often neglected and serious losses result. Therefore, to augment other efforts being made to produce larger crops of sweet potatoes, which were necessary to meet wartime food needs, studies of poisons applied on growing crops for the control of this pest were continued during 1943.

The results of these experiments showed that the yields of weevil-free potatoes are increased from 200 to 500 pounds per acre by dusting the growing crop with calcium arsenate. In other words, the check plots, which received no poison applications, had from 200 to 500 pounds of weevil infested potatoes per acre. The best results were obtained with bi-weekly applications of calcium arsenate over a period of two months beginning about one week after the plants were set in the field. The results showed also that there was little or no difference in the effectiveness of the different kinds and brands of calcium arsenate, but only the neutral or basic ones caused no injury to the plants.

The elimination of living plant material, green vines as well as potatoes, at digging time, is one of the important sanitation practices indicated above. In order to find an effective way to kill all living vines which might serve as food and breeding places for the weevils during the winter months, preliminary experiments were made by applications of chemicals just previous to digging. The results of these tests showed that calcium fluosilicate dusted on the vines just before digging killed them in a few hours. These experiments were not extensive, but the results offer some promise for the use of calcium fluosilicate, or other chemicals that might be discovered, in destroying infestations of this insect in volunteer potatoes and wild host plants as well as eliminating them as breeding places.

Unified Control for Boll Weevil and Cotton Aphid Necessary in Cotton Production . . . C. O. Eddy, E. H. Floyd, C. B. Haddon and J. L. Creigler

The results of extensive experiments and the experience of cotton growers in recent years showed that cotton yields often were actually reduced when calcium arsenate was used for the control of light to moderate boll weevil infestations. Observations showed also that this was due to heavy aphid infestations which followed the calcium arsenate applications. The aphid build-ups resulted from the poison killing the natural enemies, especially the predators of the aphid. When this became known,

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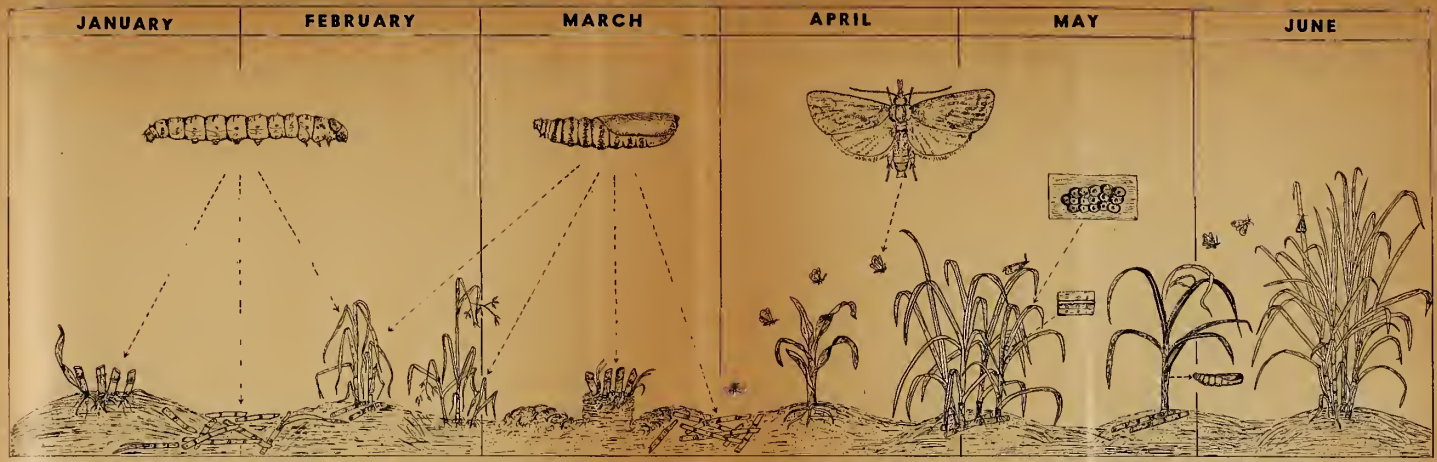


Borer overwintering in tops, cane pieces, young plants of summer planted cane, etc.

Burn trash, tops, pieces, etc., thoroughly.

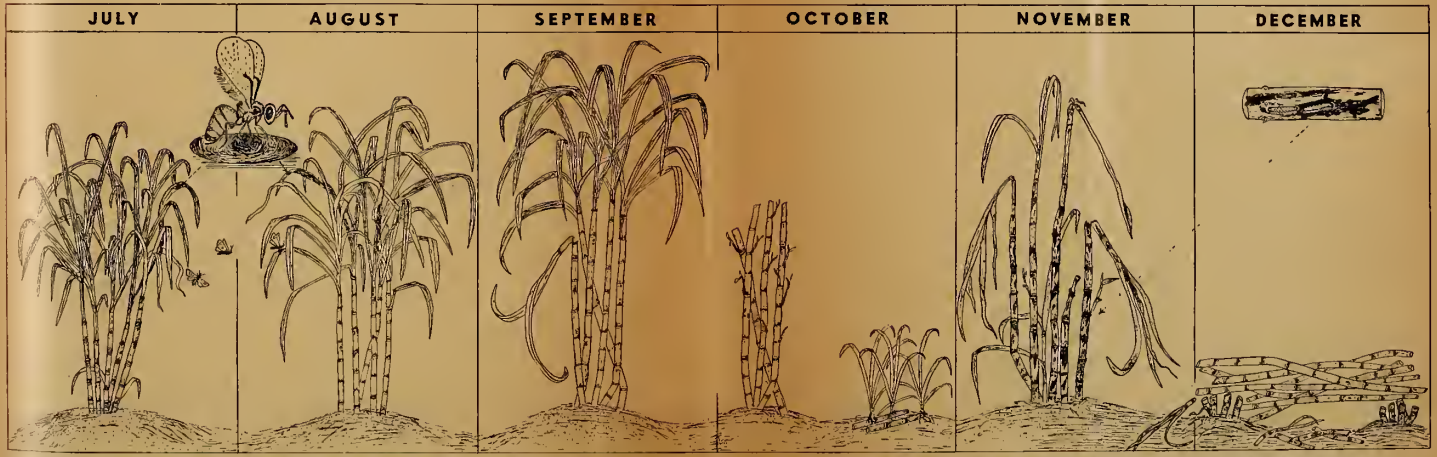
Larvae transforms to pupa, or resting stage.

Moths emerge and lay eggs on young corn and cane for first generation.

Result of first generation injury is a dead heart or dying of the plant.

Cut out dead hearts.

Moths emerge from dead hearts and infested corn; lay eggs for second generation.



Second generation borers injure lower joints, sometimes cause dead tops.

Moths lay eggs for third generation. Trichogramma parasitism of borer eggs increases.

Fourth and occasional fifth generation develop, causing bored joints, dead tops, broken tops.

Borers remain in infested seed cane; reduce stands.

Plant borer free cane.

Severe injury reduces yield of cane and of sugar.

Harvesting completed. Borers remain in cane pieces, etc.

Make thorough cleanup.

Chart showing seasonal history of sugarcane borer, *Diatraea saccharalis* (F.) in Louisiana. During late fall and winter, November to March, borer larvae are hibernating in cane tops, pieces, stubs, grasses, etc. Overwintered borers begin to mature in large numbers about April 15 to 20. Moths fly over to young corn and cane to lay eggs for first generation. In late May and June, deadhearts, or dying of the central whorl of the plants, follow first generation attack. Borers reach maturity in June and moths begin laying eggs for second generation about June 10 to 15. A third, fourth, and occasional fifth generation develop before winter. Natural parasitism of borer eggs, by *Trichogramma*, begins in the second generation and increases throughout the season. Borers start to hibernate in late September. (Prepared by A. L. Dugas, Louisiana Agricultural Experiment Station.)

studies on counteracting the ill effects of the calcium arsenate applications through the use of aphicides were initiated.

The results of the aphicide studies showed that of the several materials tested nicotine was the most effective and practical one to use. The results showed also that nicotine used alone usually gave increases in yields, thus indicating the importance of the aphid as a pest of cotton. The increases secured from the use of combinations of the two materials, calcium arsenate and nicotine, almost always exceeded those resulting from nicotine alone. However, these increases seldom doubled those from nicotine alone, indicating that greater benefits were being derived from the nicotine than from the calcium arsenate alone.

Although the calcium arsenate-nicotine dust mixture proved to be an effective cotton insecticide, its use was difficult to popularize. This was largely because the liquid sulphate form of nicotine was used which was somewhat difficult and disagreeable to mix with the calcium arsenate. Therefore, attention was given to developing new forms of nicotine and other poisons for the control of the boll weevil and other cotton pests which would inhibit, or at least would not enhance aphid build-ups. Therefore, during 1943 considerable time was devoted to the study of two new nicotines, in dust form, as additives to calcium arsenate, and to other kinds of arsenicals and flourine compounds.

The results of these studies show that either a free form (Blackleaf 10) or a fixed form (Blackleaf 155) of nicotine can be used instead of the liquid sulphate in calcium arsenate in boll weevil and aphid control on cotton. Although these dust forms of nicotine are easy to mix with calcium arsenate mechanically, the free form, which is volatile, is just as disagreeable to handle as is the sulphate. And too, the cost of the nicotine in the free and fixed forms is approximately $1\frac{1}{2}$ times that of the nicotine sulphate. Also the results and observations indicate that it is extremely important that the dusts be so applied that they will penetrate among the plants and remain suspended in the air for as long a time as possible. It is not necessary that dew be on the plants in order to make the application successful. On the other hand, dew does not normally interfere with these mixed dusts.

All of the above work is supported and substantiated by the research of the United States Department of Agriculture laboratories on cotton pest control located at Tallulah, Louisiana; Leland, Mississippi; and Waco, Texas. Specialists from these laboratories assisted in the compilation of the recommendations for the 1944 cotton insect pest control program. It was issued as "Insect Pest Control Service Leaflet No. 26" (Revised February 16, 1944), which is available upon request.

During 1943 a great many different combinations of sodium fluosilicate were studied with the idea of evaluating this poison as a control of

the boll weevil and other destructive cotton pests. The most promising of these dust mixtures tested (formula No. 8) consisted of: 75% sodium fluosilicate, 8% bran, 7% soy flour, 8% wheat flour and 1% tricalcium phosphate. This dust mixture caused no injury to the plant, gave a reasonable control of the boll weevil and boll worm and the aphid build-up was relatively unimportant when compared with the build-up following calcium arsenate applications.

In the studies on the control of the cotton leaf worm, lead arsenate gave the best control. Cryolite even at 50% dilution with pyrax gave nearly complete control of this pest the first day. The control from the cryolite when applied at seven o'clock in the morning was nearly completed by noon of the same day. Calcium arsenate was not only slower in killing the caterpillars but failed to give as complete a control as did either the lead arsenate or cryolite. A copper arsenate-sulphur combination also gave practically complete control of this insect.

Fertilizer and Feedstuffs Laboratory

* * *

Activities of the Laboratory . . . A. P. Kerr

The routine analysis of samples of fertilizers, feed stuffs and insecticides sold in the state composed the major part of the work done in the Laboratory during the past year. In time of war certain ingredients in all three products are scarce and substitutions are made. The collection and analysis of samples thus becomes more necessary than ever in preventing undesirable changes in the quality of these commodities.

Routine feed, fertilizer and insecticide samples are collected and sent to the Laboratory by the State Department of Agriculture. The chemical analyses are reported to the State Department of Agriculture and mailed out from that department. The Fertilizer and Feedstuffs Laboratory analyzes yearly for the Department of Agriculture about 1000 samples of fertilizers, 1200 to 1500 samples of feed stuffs, and 50 to 75 samples of insecticides. All types of insecticides are analyzed, particular attention being given to calcium arsenate, Paris green and lead arsenate.

Miscellaneous work averages from 700 to 800 samples a year. This work includes samples of waters, fertilizers, feeds, insecticides and other materials sent in to the Laboratory by farmers, business concerns, various branches of the Experiment Station and different departments of the University. Samples are received from all over the State. Chemical analyses of waters are made for agricultural purposes only. Farmers send fertilizer samples which represent portions left over from the previous year or those about which something is not understood. Feed samples from farmers consist of commercial preparations or the farmers' own feeding products.

Two or three poison cases are sent to the laboratory each week from different sections of the state. Never has a poison case been traced to a feed when it left the manufacturer. The feed has always been contaminated on the premises of the man using the feed.

The character of miscellaneous work varies from year to year. During the past year the Laboratory has cooperated with several departments

of the Experiment Station and of the University. Analyses were made of tung oil nuts, sweet potatoes, hays, meat meals, etc. The Laboratory co-operated with the entomologists employed by the Federal Government at the University by determining arsenical residues on cabbage ready for market. The Laboratory also aided the State Conservation Department in making the salt survey of the irrigation waters of southwestern Louisiana. Cooperative work involves from one or two samples in some cases to hundreds of samples in others.

Food Preservation

* * *

Establishment of Food Preservation Department

C. W. DuBois

The Department of Food Preservation was authorized and an appropriation was made by the Louisiana State Legislature during its session in 1942. On January 2, 1943 the work of organizing and developing such a department was inaugurated. The department is to do research in preservation of human foods.

The work includes the various phases of food preservation with particular emphasis on freezing preservation of fruits, vegetables, meat, poultry, and marine foods. Studies are considering the problems connected with (1) maturity of vegetables and fruits for the best finished product, (2) varietal adaptation of products to the preservation process, (3) methods of handling, preparation and treatment and processing for high quality products, (4) the effects of different methods of processing and treatments on the quality of the finished products, (5) types of packaging materials and packaging methods connected with processed foods, and (6) effects of temperature and conditions of storage on quality of food products.

The results from these studies have a particular application to the commercial food-packing industry, locker industry, and home processing of foods in Louisiana.

During the past year considerable time was consumed in organizing and equipping a workable laboratory. Because of priority regulations progress was somewhat impeded but because of the nature of the work to be carried on, priorities were granted. Processing equipment of various kinds, laboratory equipment and controlled temperature storage rooms were planned and obtained. In many cases special equipment was designed and constructed.

Projects are in progress and we are awaiting results.

Horticultural Research

* * *

The early work in this department was concerned mostly with cultural and physiological problems. After seeing the need for better varieties the present research program was begun, centered around breeding of horticultural plants for regional adaptability, disease resistance, and for higher food values. Some of the more fundamental phases of the research have been curtailed to some degree due to the fact that two of our staff members are in military service. However, every effort has been made to cooperate with other departments* and with members of the Army Quartermaster Corps to make the research more effective in the food production program.

Sweet Potato Breeding . . .

Julian C. Miller, M. B. Hughes, and T. T. Ayers

In spite of the reduced personnel, both staff and student help, the sweet potato breeding program has been carried on without any serious interruptions. Cooperative agreements are in effect with 10 experiment stations and they have been supplied annually with about 25 thousand true seeds plus 50 of the better seedlings. Both potatoes and seedlings are sent to additional experiment stations as well as to foreign countries. In the past special attention has been given to the selection of parental stocks. During the past season the poorer parents have been eliminated and work is being increased with the better parents. Crosses have been made between the better seedlings, and crosses will be made between the better lines as well as back-crosses to the desired parent. Due to the heavy sweet potato weevil infestation at the main station at Baton Rouge the seedlings will be grown in weevil free area near St. Francisville, Louisiana. Two of the better table stock seedlings are now being grown for increase. One, the 1x6-39-10, has proved to be superior for dehydration and canning. Although it does not yield as much in south Louisiana as the Unit I Porto Rico, in north Louisiana it yields as much or more. It grades out a higher percentage of No. 1 potatoes. The second seedling, the 1x42-39-3 has proved to be very desirable for the main sweet potato

* Vitamin C. determinations were made by Miss Martha Hollinger, Nutritional Research Laboratory, Louisiana Agricultural Experiment Station

producing area, particularly around Scott, Louisiana. This seedling is very uniform in shape and produces a satisfactory yield of potatoes, again grading out a higher percentage of No. 1's than the standard Unit I. In certain soil types this potato is subject to cracking while the 1x6-39-10 is very resistant to cracking, however, under certain conditions the 1x6-39-10 develops veins instead of cracks. Both seedlings have a deeper yellow color (higher in carotene content) than the Unit I. Around 1000 bushels of each of these potatoes will be grown in the state this year. The Army officials are particularly anxious to have these seedlings increased and used in the dehydration and canning programs as they possess a higher carotene content and give a brighter appearance.

The starch and feed seedling, L 4-5, is increasing in popularity and in demand. It is now considered the leading starch potato. Pathologists have found it to be immune to wilt, one of the major sweet potato diseases in this country. A number of feed and starch companies are using it entirely now. A special cooperative test was run by this institution and Joseph E. Seagram and Sons, Inc., for the purpose of using sweet potatoes for making alcohol. Fifteen thousand pounds of dehydrated L 4-5 and a similar quantity of Unit I Porto Rico potatoes were shipped to Louisville for the alcohol test. Both lots of sweet potatoes proved very satisfactory. From 56 pounds of dehydrated Porto Rico potatoes 4.85 proof gallons were produced while with an equal quantity of L 4-5 potatoes 5.15 proof gallons were produced. Yields of alcohol from these potatoes, particularly from the L 4-5's were equal to or superior to any of the grains.

We have continued to work closely with the Army and its dehydration food program. Last year the Army contracted for around 15 million pounds of dehydrated sweet potatoes and Louisiana furnished about one-half of this amount. For 1944 they plan to purchase around 20 million pounds. Due to better quality of potatoes produced largely from the Unit I Porto Rico strain the Louisiana growers will be able to furnish about one-half of the Army's requirement.

Breeding of Cabbage and Collards . . . Julian C. Miller

Principal work on cabbage breeding this past year has been to make closer selection for a pure line having a compact head with a short core. This meant growing a larger acreage and examining a larger number of selected heads. Over 200 heads were selected with the core lengths not over one-fourth of the diameter of the head. Twenty pounds of seed stock will be produced from these 200 heads. This stock seed is sent out each year to leading cabbage seed growers over the country who desire to increase the Louisiana Allyear which is the name given this variety. The parentage is Louisiana Copenhagen X Marion Market, the F_1 of

which was crossed with the Charleston Wakefield. This cabbage is very vigorous and resistant to heat and cold. Average weight per head is around $3\frac{1}{2}$ to 4 pounds. As a result of technique developed at the Louisiana Station (selecting heads and growing a crop of seed from the stumps) cabbage seed growers were able to produce a large crop of seed this past season in southern California. This came as a definite help to the country as the crop of cabbage seed in other areas was practically a failure. Several growers and one seed company produced satisfactory cabbage seed of the Louisiana Allyear variety in this state.

Stock seed of the Louisiana Sweet collard is still being grown and selection for uniform plants with the darker leaf color is being continued.

Irish Potato Breeding . . .

Julian C. Miller and E. L. LeClerg

In addition to breeding for disease resistance, particularly the mosaics, special attention is being given to breeding varieties for higher solids, primarily starch. Dry weight and vitamin C determinations are made on the more promising seedlings each year. Usually the higher the solids the greater the nutritional quality of the potato. In addition to these characteristics it is believed desirable to breed more seedlings having yellow flesh color. The more yellow the flesh the higher the vitamin A content. Irish potatoes at the present time are very low in this vitamin. Most of the European table stock varieties have yellow flesh. In addition to growing the usual number of seedlings (about 5,000) the work this past season consisted of making a thorough study of seedling populations and discarding a large number of the mediocre selections. Two of the better seedlings will be named and are now being increased in the North for distribution in this state. The red seedling which is a Triumph-Katahdin cross TK 3-39-14, has been named the DeSota. This is a high yielding mid-season variety. The second seedling is a cross between the Chippewa and an inbred Triumph, ChxT (3-1) 1-66, and has been named the LaSalle. This is a white seedling and is slightly earlier than the DeSota. Both seedlings produce excellent yields from both fall and northern seed. Both seedlings also produce well in the North. There should be about one-half a car of each of these varieties for sale next year and thereafter seed should be available in carload lots. So far mosaic has not been found in the LaSalle and only a very small percentage of mosaic plants have been found in the DeSota. It can be said that both seedlings show a distinct resistance to mild mosaic. Each of these seedlings produces a higher yield than the Triumph, our standard variety and since they show considerable resistance to mosaic, losses caused by this disease will be decreased. Due to the fact that these potatoes produce a very good crop from fall grown seed, if a grower cares to, he can produce his own seed, particularly for the home garden.

Selection and Breeding of Creole Onions . . .

Julian C. Miller

This project has been conducted by Dr. F. D. Cochran who is now in military service. Sufficient onions are being grown to supply stock seed of the principal strain, the C-5, and seed stock of one of the white selections is being increased. The white selection is by no means as pure as the C-5. A number of promising seedlings are being tested in cooperation with Dr. Henry Jones, U. S. Department of Agriculture, Beltsville, Maryland. These are primarily crosses between the C-5 strain of Creole and some of his better selections. These are being tested for higher solids.

The Creole analyzed 17.5 per cent solids; three of Dr. Jones' better seedlings analyzed 12.5, 13.2 and 15.8; and the Bermudas analyzed 6.7. For a variety to keep in Louisiana it must have high solids. The three better seedlings mentioned should keep until shipped or dehydrated, but not as well as the Creole. They produced yields that were practically twice as high as the Creole, however. As a result of the Creole onion being higher in solids and possessing excellent keeping qualities as well as flavor, the Army and private agencies want to purchase this variety for dehydration.

The Strain I shallot which was introduced by the Station several years ago has practically replaced the old types of shallots. If it had not been for this new strain the shallot industry would probably have disappeared. The growers of the state have requested the Louisiana State Penitentiary at Angola to produce 400,000 pounds of this shallot for seed.

Tomato Breeding . . .

Julian C. Miller and P. L. Hawthorne

The work with tomatoes consisted of breeding varieties resistant to wilt, and for high solids and Vitamin C content. Due to the shortage of help, work has been materially reduced. Only the more advanced lines were grown this year. Seed of other lines were placed in cold storage to be held in reserve for work at a later date. Sufficient quantities of tomatoes are being grown at the main Station to make solids and vitamin C determinations, test for wilt resistance, and local adaptability. Yield tests are being reported by P. L. Hawthorne from the Calhoun station. It will be noted that 10 seedlings out-yielded the Marglobe, the standard variety, by 3,000 pounds per acre. Of the 24 different tomatoes tested for vitamin C, two of the seedlings proved to be superior. The best one of these seedlings contained 29.0 milligrams of ascorbic acid per 100 gram sample. This seedling is a cross between the Louisiana Slicer, one of the breeding parents, and the Marglobe. The dry weights of the seedlings

THE DIXIE TOMATO
Showing Typical Shape of Fruit

varied from 5.5 to 6.9 per cent. In selecting a new seedling, only those possessing high solids are kept. Each year seedlings are grown on wilt infested soils and plants showing this disease are discarded. The Dixie, an introduction of a few years ago, has proved to be one of the best home garden varieties for south Louisiana for both spring and fall. It is very vigorous and wilt resistant. It produces large meaty fruit with few seeds.

Strawberries . . . . Julian C. Miller, W. F. Wilson, W. D. Kimbrough, and A. G. Plakidas

No new seedlings were grown this year, the work consisting primarily of testing 30 of the previous years' selections. They were tested for vitamin C, soluble solids, and dry weights, as well as for quick freezing, table quality, yield, and disease resistance.

To date this Station has introduced two varieties, the Klonmore and Konvoy. Each year sees the Klonmore growing in popularity and now a high percentage of the crop grown in the state is of this variety. Shippers and buyers are becoming better acquainted with this berry and have found, as was previously reported, that it carries better in shipment than the Klondike. The Konvoy is a very high yielding variety but possesses a somewhat tender skin. It has to be handled carefully under best conditions for shipment. It would be at it's best for home garden and for quick freezing. It has been superior to all other varieties in a test in north Louisiana.

The following table gives dry weights, soluble solids in juice, plant production ratio and ascorbic acid (vitamin C) of four varieties and five seedlings. For a variety to be worthy of introduction it should have

Dry Weights, Soluble Solids in Juice, Plant Production Ratio, and Ascorbic Acid of 5 Selected Seedlings and 4 Varieties

Variety or seedling	Dry wt. 2 yr. ave.	Soluble solids in juice (ave. of 3 determinations)	Plant production ratio	Mg. ascorbic acid per 100 grams
Klondike	8.23	7.50	22.5	52.9
Klonmore	8.50	8.40	17.5	60.6
Konvoy	7.46	7.10	21.3	61.5
Fairmore (660)	9.88	8.90	3.4	85.2
122-11x669-42-1	7.98	7.00	7.5	50.0
122-3x669-42-4	6.27	6.90	31.3	50.9
119-4x630-42-6	8.45	8.20	55.0	53.0
K op/41-42-1	8.50	8.30	73.0	56.5
630x669-42-4	7.28	9.00	15.0	65.3

a dry weight of 7 per cent or higher and soluble solids in the juice should be 7 per cent. The higher the dry weights and solids usually the better the quality of the berry. The firm berries, as a rule, show a high dry weight reading while the juice of a sweet berry generally shows higher soluble solids than one that is sour as most of the solids in the juice are in the form of sugar. Seedlings must have high plant production ratio, that is, from one single mother plant set to the field in June or July, 15 desirable plants for the production of berries should be produced by October 15. The plant ratio production will depend largely on weather conditions. Each desirable seedling is also tested for ascorbic acid (vitamin C). It will be noted that vitamin C varies considerably in different seedlings. There are several seedlings that were much higher than those shown in table 1. The Fairmore variety, which is one of the highest in vitamin C, is being used as a parent.

A Carrier Showing Typical Klonmore Berries

Before any of the seedlings are set to the field they are tested for disease resistance by spraying with a spore suspension of leaf spot and scorch. Any seedling showing as many as three spots per leaf is discarded as being a susceptible variety.

Breeding of English Peas . . . Julian C. Miller

Not many of the standard commercial varieties of peas are suited to Louisiana. The Creole which has been grown in the southern part of this state since the time of the early French settlers is a very hardy variety, being resistant to both cold and heat and highly resistant to root rot. Most of the commercial varieties lack vigor, so in order to increase the vigor and develop hardy varieties the Creole variety was crossed with several of the standard varieties. The number of selections has been re-

duced now to 35 and one of these selections, the G 1-2, is being grown for increase. This is a cross between the Creole and Thomas Laxton. The pods and peas are dark green in color and the plant possesses the vigor of the Creole. In cooking and tasting test, comparing a number of seedlings and varieties, the G 1-2 proved to be superior in color, however, it is not as high in sugar as a number of the other selections. It begins fruiting near the ground and when grown on a trellis the vines reach the height of about five feet. The pods are $3\frac{1}{2}$ to 4 inches in length and set 7 to 8 medium size peas per pod. Soluble solids analyzed 14.2 per cent. Under the same conditions there were other seedlings that were as high as 16 per cent. The G 1-2 is about 10 days earlier than the Creole and about a week later than the Thomas Laxton. It is now being increased by two seed companies and seed should be available for release within the next year.

Study of Some Genetic Characters of the Sweet Potato

M. B. Hughes and Julian C. Miller

Studies have been undertaken to determine the manner of inheritance of some of the economically important characters of the sweet potato. The two most important characters being studied are flesh color and wilt (stem rot) resistance. The necessity for large populations in order to draw valid conclusions on inheritance requires that heavy-blooming, highly fertile parents be used. It was found in last year's work that crosses between spare blooming types produce F_1's which bloom too weakly to give a sufficient F_2 population. For this reason a large proportion of the F_1's from 1942 crosses must be discarded without carrying through the F_2.

Some progress in wilt resistance studies has been made. At present some one hundred F_1 individuals from crosses of wilt resistant x wilt susceptible parents are in the process of being tested by Dr. T. T. Ayers. F_2 and backcross seed obtained from these F_1's last summer will soon be grown and tested for resistance. Thus we will have by midsummer, data on wilt resistance in the F_1, F_2, and backcross progenies from crosses of wilt resistant and wilt susceptible parents which should make possible a tentative hypothesis concerning the inheritance of this character.

Tung Trees . . . W. D. Kimbrough and W. F. Wilson

The development of the tung oil industry in the lower South is important especially in war time. The high price of the oil has given owners of productive groves very profitable returns.

Most of the producing tung groves were grown from unselected seed and are quite variable in type and yield. Experimental work with trees grown from nuts from selected trees shows that some of the lines are quite uniform while others are variable. Some were found to be more cold resistant than others. It is believed that seed for tung groves should

be from selected trees and that in a few years such seed should be available. One selection in the experimental planting seems to be an exceptionally good one. Seed from a tree, known as the McKee, has been planted commercially to some extent and has produced uniformly good, high producing trees.

Fall Irish Potatoes . . . W. D. Kimbrough

The production of food crops at home is especially important during war time. To grow potatoes in Louisiana for winter use they should be grown in the fall. In general the fall crop is not as certain nor as productive as the spring one. The main difficulties of getting a good crop of potatoes in the fall are getting a good stand and enough water to make the crop. Uncut potatoes have been found to give the best stands and the No. 2 size from the spring crop is recommended for fall planting. Cut seed pieces have generally given very ragged stands and in some instances no germination at all. In the Baton Rouge area about September 1 has been found to be the best time of planting. The Irish potato plant grows best in cool weather and if planted too early the growth is very unsatisfactory and the potatoes produced may not be very smooth.

If fall potatoes have been kept free of disease they can be used for seed potatoes the following spring. If they are to be used for seed they should be kept at relatively high temperatures from about 10 days to two weeks after they are dug until planting time. The following results are a three-year average of fall grown potatoes kept at 80°F. used as seed in comparison with certified seed from the North.

Variety	Type	Yield in bushels per acre		
		No. 1	No. 2	No. 3
Triumph	Certified	134.4	27.4	9.3
Triumph	Fall grown 80°F.	147.5	19.3	7.1
Katahdin	Certified	163.2	14.8	4.4
Katahdin	Fall grown 80°F.	166.1	10.8	3.9

Production of Sweet Potatoes for Industrial Uses . . . W. D. Kimbrough

There is considerable interest at the present time in the production of sweet potatoes for stock feed and very recently for alcohol. Details of what may be expected in the way of yields of sweet potatoes can be found in Louisiana bulletin 348. If plants of improved types are set to the field early it is easily possible to obtain yields of from 300 to 600

bushels of usable potatoes per acre, if conditions are favorable. Potatoes grown for industrial use do not have to be handled as carefully as those grown for table use and as a result, cost of production is less. The amount received per bushel of sweet potatoes for industrial use is of necessity lower than that for human food. For this reason it may be desirable for development of the industrial sweet potato industry to be in sections where potatoes are not grown to ship fresh to market or for dehydration for food. Only cull potatoes could be profitably used for industrial purposes in the present commercial sweet potato areas which grow the Porto Rico variety.

So far the L 4-5 seedling has proved to be the best sweet potato for industrial use. It is a good plant producer, stores well, produces high yields of potatoes that are relatively high in solid content, and is resistant to wilt. Two other seedlings have produced, at times, more solids per acre than has the L 4-5, but they have not consistently done so, and do not at present seem to be as good all-around potatoes for industrial use as L 4-5.

Gladiolus . . . W. D. Kimbrough

The gladiolus is one of the most popular cut flowers grown, both commercially and in home yards, and even in war times ornamentals should not be neglected.

Experiments have been conducted to get information on the culture of gladiolus in the deep South that should be of interest to many. These results have been published in Louisiana bulletin 372 which is available to those interested in it. The most important points in connection with the culture of gladiolus are the following: plant as early as possible, without danger from freeze injury; plant No. 1 corms for best results; get new corms at least every third year, new corms every year would be better if it can be afforded; store corms at 40°F if possible; because of disease it is best not to plant gladiolus on the same soil oftener than every fifth year. The following varieties have proved to be very satisfactory: Picardy, Maid of Orleans, Minuet, and Margaret Fulton.

Plant Pathology

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How Sugarcane Becomes Infected with Red Rot . . .

C. W. Edgerton and Fernando Carvajal

It has been known for a long time that sugarcane can become infected with red rot through wounds and especially through borer channels. Infection in any other way while suspected has not been proven. During the past year, however, it has been shown that red rot can infect leaf sheaths without injuries. The spores which are produced on the upper surface of the leaf midrib are washed down behind the leaf sheath. Each spore on germination produces a thick-walled body called an appressorium which becomes attached to the inner epidermis of the leaf sheath. This body on germination sends a very small thread directly through the cell walls and into the interior of the leaf sheath. Such leaf sheaths become covered with red to brown rot lesions. These observations have demonstrated how easily red rot can spread in the field and have shown the necessity of using varieties that are somewhat resistant.

The Role of the Experiment Station in Controlling Red Rot and Mosaic of Sugarcane . . .

I. L. Forbes and P. J. Mills

Red rot, which is caused by a fungus, is the disease most responsible for poor stands of cane. In addition, rather severe losses occur often as a result of red rot developing in standing or mill cane of susceptible varieties, particularly where borers are prevalent. For a number of years now the Experiment Station pathologists have been testing all new promising varieties of sugarcane to determine their resistance or susceptibility to red rot. This is done by inoculating cane stalks in the laboratory, stalks or "seed" for planting, and standing cane. By such a series of tests, definite information in regard to the susceptibility or resistance of the different seedlings and varieties is obtained. With this information it is possible to recommend without hesitancy whether or not a particular variety, otherwise promising, should be released to the Sugar Industry for commercial planting. As a result, red rot is not the hazard today that it was with the old Noble varieties that were grown before such testing was inaugurated.

In recent years only varieties immune or highly resistant to mosaic have been recommended for release to the Industry. As a result, mosaic

is not a serious problem in any of the newer or C.P. seedlings that are being grown commercially in the State. With the Coimbatore canes, Co. 281 and Co. 290, however, which are very susceptible to mosaic, the Station puts forth every effort to get growers to rogue seed plots and to use only mosaic-free cane for planting. With Co. 290 in particular, this control practice has resulted in a saving of hundreds of thousands of dollars to growers in St. Mary Parish alone.

Treatment of Shallot Sets with Fungicides Has Not Been Effective . . . E. C. Tims

Pink root is the most serious disease of shallot in the principal shallot-growing sections of the State. The fungus parasite that causes pink root is carried on the roots and basal portions of the diseased sets. It also lives over in the soil and will infect healthy sets if they are planted there. A set treatment test was made to determine whether the pink root fungus could be eliminated from the diseased shallot sets. Soaking diseased sets in mercuric chloride 1-1000 for 20 min. reduced the number of plants with pink root about 50%, but did not eliminate the disease completely.

Several shallot set treatment tests were made during the fall of 1943 to determine whether the stands could be improved. Some of the newer fungicides such as Spergon, Barbak, and Thiosan were used along with bichloride of mercury and Semesan. Replicated plots were planted with treated sets along with appropriate controls. None of the treatments gave significant differences in stands or numbers of saleable bunches of shallots in these tests.

Control of Limb Blight of Fig . . . E. C. Tims

A limb blight disease of fig is found scattered over the southern part of the State. It differs in appearance from the leaf blights in that entire twigs or large branches die suddenly in the spring or summer. The leaves become dark brown and hang on for weeks after the limb dies. Cankers covered with a bright pink fungus growth can be seen on the affected limbs. The disease may spread from the cankers to other limbs and cause serious injury to the tree. Satisfactory control of limb blight was obtained by pruning out the diseased limbs and painting the cut surfaces with copper-hydro 40 paste made with raw linseed oil. Care should be taken to cut off the dead branches several inches below the diseased portions.

Yellow Chlorosis in Shallots . . . E. C. Tims

Shallots affected with a yellow chlorosis have been observed occasionally in the State for several years. The plants are bright yellow in color and usually, but not always, somewhat stunted. Some of the yellow plants are infected with pink roots, others develop a soft rot at the soil line, but

these conditions are apparently secondary in importance to the chlorosis. Shallots showing the yellow chlorosis invariably die when transplanted. The large summer shallot grown on the Station at Baton Rouge has also shown the yellow chlorosis. Affected plants show a similar type of yellowing as the ordinary shallot, but they are usually severely stunted and distorted in shape. The typical yellow chlorosis has not been observed in the State on onion or garlic. Information obtained recently indicates that the yellow chlorosis is probably the well known *yellow dwarf* virus disease of onion which has caused serious damage in other sections of the country.

Soybean Diseases in Louisiana . . . L. H. Person

On account of the rapidly increasing acreage and its importance in the food production program, the soybean has become an important Louisiana crop. Many complaints have come to the Experiment Station in regard to poor yields and diseases of various kinds. The following brief notes regarding the diseases of soybean known to occur in the State may be of aid to growers in diagnosing troubles which may appear in their fields.

Bacterial blight (*Bacterium glycineum*) is the most widespread disease and can usually be found to some extent in every field. The disease appears on the leaves as small angular to irregular yellow spots which later become dark brown to almost black in color. The diseased areas become dry and brittle, often dropping out and giving the leaves a ragged appearance. The disease may also occur on the stems and pods. It has been shown that the disease is seed transmitted.

Bacterial pustule (*Bacterium phaseoli* var. *sojense*) is similar to bacterial blight in appearance. It can usually be distinguished from the bacterial blight by the appearance of slightly raised, somewhat roughened pustules that are present on the leaves. In later stages the spots may be small and localized or aggregated together forming large, irregular areas. Often portions of these areas fall out, leaving the leaf ragged in appearance.

Southern blight (*Sclerotium rolfsii*) can usually be found in every field, but is more serious in the lighter sandy soils. The fungus attacks the stem at or near the soil surface, producing a white cottony mycelium growth on the stem and causing yellowing and wilting of the entire plant, which then dies. If the attacked or dead plants are examined, numerous small round sclerotial bodies will usually be found near the soil surface; these are the fruiting bodies which perpetuate the fungus from year to year in the soil. In some fields only an occasional plant or a small percentage of the plants will be attacked, while in others, when conditions become favorable (high temperatures), losses may be as high as 15 to 25 per cent of the crop. This fungus also attacks a wide variety of plants

which makes control a difficult problem after it once becomes established in a field.

Charcoal rot (*Sclerotium bataticola*) is caused by a fungus that attacks both roots and stems, sometimes killing the plants in the seedling stage. The disease can be recognized by the presence of small black sclerotia, which develop beneath the epidermis of infected plants and can only be seen after the epidermis has been removed or sloughed off. This disease is found primarily in the southern states and is more severe during long, hot, dry periods. It was especially severe during the summer of 1943 in Mississippi and Louisiana when such conditions prevailed. The causal organism is widely distributed in the soil and attacks numerous cultivated plants such as beans, cowpeas, corn, and sorghum.

Pod and stem blight (*Diaporthe sojae*) was reported for the first time in Louisiana in 1943. The disease can be recognized by the presence of numerous black pycnidia scattered over the diseased and dead portion of the stems and petioles. Infection usually occurs at the junction of a branch with the stem, causing a girdling and killing of the attacked plants. In 1943 this disease and charcoal rot were often found associated together.

Minor Diseases of Soybean . . . L. H. Person

Frog-eye leaf spot (*Cercospora diazu*) is frequently observed but is of minor importance. This disease is found primarily on the leaves; however, as the plants reach maturity it will be found as elongated lesions on the stems. Some varieties are much more susceptible than others.

Mosaic, a virus disease, is found to some extent in most fields. The symptoms vary from a crinkling or slight wrinkling of the leaf surface to a puckered appearance of the leaves. Plants severely affected with mosaic are usually stunted.

Downy mildew (*Peronospora manshurica*) occurs occasionally on very early planted soybeans. The disease does not develop during the warmer weather of the late spring and summer. The leaves are much twisted and curled and usually have a frosty covering of conidiophores and spores. The affected leaves fall off and the plants remain stunted.

Control of Root Rot in Rice . . . S. J. P. Chilton

Experiments on the use of fertilizer in root rot areas in rice to increase yields have been carried on for several years. The treatment, consisting of a 400 lb. application in June of a 10-10-0 mixture of ammonium sulphate and acid phosphate, has given an average increase of 3 barrels of rice per acre in 4-year tests. This is a net increased value of $11.75 an acre at present rice prices, after the cost of the fertilizer is deducted. On certain farms the net increase in value has been as much as $25.00 an acre.

In 1943, because of the present shortage of nitrogen fertilizers, two other treatments were added to the tests: A 200 lb. application of the 10-10-0 mixture and a 400 lb. application of a 4-12-4 fertilizer. Results indicate that the 200 lb. application may give a larger net return under certain conditions than the 400 lb. application.

Seed Treatment of Rice . . . S. J. P. Chilton

Early planting of rice, while usually advantageous, has the hazardous feature of poor stands which often necessitates replanting. Several compounds which are applied as dusts to the seed have given satisfactory results with other crops and it was felt that one of them might be of value with rice. In 1943, a preliminary experiment with five dusts and three dates of planting was made with Blue Rose and Fortuna rice. Arasan, one of the dusts used in the March 19 planting, increased stands from 20% to 53% with Blue Rose and from 11% to 32% with Fortuna. Little increase in stands occurred in April and May plantings. These results indicate the possibilities of seed treatment with early planted rice.

Blue Rose 41 . . . S. J. P. Chilton

The new disease resistant variety Blue Rose 41, a selection from Blue Rose, was included in 1943 in two outfield tests in Jefferson Davis Parish and Vermillion Parish, for the purpose of comparing it with Blue Rose. Two tests were also made at the Crowley Experiment Station. Blue Rose 41 averaged 2.6 barrels more per acre than Blue Rose in the four tests.

Disease Resistant Varieties of Rice . . . S. J. P. Chilton

In cooperation with the U.S.D.A. plant breeder, at the Crowley Experiment Station, a large number of varieties and selections are tested each year for their resistance to the various races of the Cercospora leaf spot fungus. Resistance to white tip is also noted. Several promising selections made by the breeder were found to be resistant to white tip and to all known races of the leaf-spotting fungus. These will probably be released by the Station when sufficient seed is accumulated for distribution. They are of the Blue Rose grain type.

Peanut Seed Treatment . . .

L. H. Person and S. J. P. Chilton

With the present emphasis on increased production of peanuts in Louisiana, it seemed advisable to determine the effect of seed treatment on stands and yields of this crop. Five dusts were tested: Arasan, Spergon, 2% Ceresan, Aconitic Acid, and Copper Aconitate. Copper aconitate gave the best results with a yield of 2168 lbs. of peanuts per acre compared to 1848 lbs. per acre with non-treated seed. Spergon was next with 2074 lbs. of peanuts per acre.

Blight of Arborvitae . . . A. G. Plakidas

A disease of oriental arborvitae, referred to locally as "blight" or "fire," has been known in the South for many years. Its chief symptoms are dying and browning ("firing") of leaves and small twigs, shedding of the dead foliage, and often complete killing of the entire tree. The disease has been attributed in the past to red spider, drought, excessive summer heat, and winter injury. The varieties Berckman's Golden and Baker are most severely affected, but the disease occurs also on many others, and also on Italian cypress.

A fungus, an apparently undescribed species of Cercospora, has been found constantly associated with the disease. Repeated inoculations of healthy plants with pure cultures of the fungus have produced the disease in typical and severe form. Infection also has been obtained by placing diseased twigs on healthy plants. Thus, the cause of arborvitae blight has been definitely determined.

The results of limited spray tests indicate that the disease can be easily controlled by spraying with copper fungicides. Three copper sprays were used; namely, Bordeaux mixture (4-4-50), Cuprocide (3 lb. per 100 gallons of water) and "Tribasic" copper sulphate (6 lbs. per 100 gallons of water). These were applied at approximately monthly intervals from June to September. All three sprays checked completely the progress of the disease. The non-sprayed plants, on the other hand, became progressively more severely diseased.

Comparison of Various Sprays and Dusts for Control of Strawberry Leaf Blights . . . A. G. Plakidas

The most serious diseases of strawberries in the State are the leaf blights (leaf spot and leaf scorch). Of these, the former is the most prevalent and more destructive, although the scorch may cause severe damage in certain fields some years. It has been determined by previous work that the leaf blights can be effectively controlled by spraying with Bordeaux mixture, and this has become a general practice among strawberry growers. Making Bordeaux mixture is "messy" and requires some skill. For this reason many growers expressed a desire for a simple Bordeaux substitute something that will come in a weighed package and that can be dumped in a barrel of water, stirred and used. "Tri-basic" copper sulphate (53% Cu), at the rate of 4 lbs. per 100 gallons of water was used for this purpose. In addition to the leaf blights, red spider is a serious pest against which sulphur dust is used. It was thought that it may be possible to use a combination of copper and sulfur dust that would be effective against both the leaf blights and the red spider. Dusting is easier than spraying and saves labor. Two such dusts were prepared, one containing 12 lb. "Tri-basic" copper sulphate (approximately 6% metallic

Cu), 50 lb. sulphur, and 38 lb. hydrated lime, and the other 6 lb. yellow "Cuprocide," 50 lb. sulphur, and 44 lb. hydrated lime.

Results: Both copper-sulfur dusts, as well as the "Tri-basic" copper sulphate spray, gave excellent control (as good as the 4-4-50 Bordeaux) of the leaf blights. The dusts, in addition, controlled red spiders very effectively.

Tests with Sprays for Control of Downy Mildew of Cucumbers . . . A. G. Plakidas

This is a continuation of the work reported previously.* For the 1943 season, the following sprays and dusts were tested:

I. Sprays.

1. Bordeaux 4-4-50, lead arsenate 3 lb., nicotine sulphate 1 pint.
2. "Tri-basic" copper sulphate 2 lb., cryolite 4 lb., nicotine sulphate 1 pint, lime 1 lb., water 50 gallons.
3. "He 175" (disodium ethylene bisdithiocarbamate) at the rate of 1.2%, + cryolite 4 lb. in 50 gallons.

II. Dusts.

1. "Blue Dust," strong: "Tri-basic copper sulphate 12% (6.36% Cu), Cryolite 33%, Black Leaf 10, 10%, Pyrax 3.5%, wheat flour 10%.
2. "Blue Dust," weak: Same constituents as for (1), but containing only 8% "Tri-basic" (4.24% Cu) and 20% Cryolite.
3. "Red Dust." Yellow Cuprocide 6% (4.98% Cu), Cryolite 33%, Black Leaf 10, 10%, Pyrax 41%, wheat flour 10%.
4. Fermate Dust. Fermate 10%, Cryolite 33%, Black Leaf 10, 10%, Pyrax 37%, wheat flour 10%.

Results: The 1943 season was most unfavorable for field tests. Drought during the second half of August caused poor germination. This was followed by flooding rains which injured the young plants and made for poor stands. Then the season, from the middle of September on, was abnormally cool. Mildew infection was very mild, and insect infestation (except aphids) was very light. Consequently, the information obtained from these tests may not be applicable in a normal season. The results are summarized briefly: (1) Bordeaux caused some injury (stunting of growth and leaf burning) but it was not severe. (2) The "Tri-basic" spray gave as good control as the Bordeaux and caused no injury. (3) "He 175" caused severe burning and was discontinued after the second application. (4) Both the strong and the weak "Blue" dusts gave good

* Louisiana Agric. Exp. Sta. Annual Report 1941-1942, Pp. 98-100. 1943.

control of mildew and insects and caused no injury. This is important because, if the weak mixture proves effective in a normal season, it will mean considerable saving in the cost of the dust. (5) The Cuprocide ("Red") dust caused rather severe injury to the vines. This was the first time that Cuprocide dust caused injury. The same dust, except that the red instead of the yellow form of Cuprocide was used in making it, was used on cucumbers in 1942 and caused no injury. (6) The Fermate dust was effective against mildew and caused no injury to the vines.

Yields Are Increased by Treating Seed Cane with Hot Water . . . P. H. Dunckelman and C. W. Edgerton

Tests to determine the value of treating seed cane with hot water have been made during 3 years. It has been found that a treatment at 52°C. for 20 minutes not only entirely eliminates the chlorotic streak disease, but also stimulates the germination of the buds on the cane and the growth of the young shoots. Tests have been made on 9 plantations in the southern part of the State. Averaging the tests during the 3 years, increases in yield with the variety C.P. 29-320 in plantings made in September and October have been over 3 tons of cane to the acre. Such increases during normal times when labor is not a problem should not only pay for the cost of treatment but should give an appreciable profit to the planter, as well as a protection against the chlorotic streak.

Ring Rot of Potato . . . L. H. Person

Ring rot of potato was apparently first observed in the United States in Maine in 1932, and by 1939 was present in most of the certified seed-growing states. The disease, which is transmitted by seed, was first noted in Louisiana in 1939, when it caused serious loss in a field of potatoes at Cut-Off. In order to prevent seed infected with ring rot from being distributed in the State, the State Department of Agriculture placed a O tolerance on this disease. All certified potatoes are inspected by State inspectors before they are released, and potatoes suspected of being infected with the disease are sent to the Department of Plant Pathology to be tested. They are stained (using Racicot's gram-positive stain) and if they are found to be infected with the ring rot organism, this car of seed cannot be sold for seed potatoes in Louisiana.

In 1940, when the ring rot tolerance was added to the certification rules, 9 cars of seed were found to be infected, in 1941, 7 cars, in 1942, five cars, in 1943, no cars, in 1944, 12 cars. Since 1940 no serious outbreak of ring rot has been reported in the State. This is probably due to the fact that most of the ring rot has been kept out of the State by the inspection service and rejection of all seed showing the presence of the disease.

Bacterial Blight of Beans . . . L. H. Person

Bacterial blight, a seed-borne disease, causes some losses to bean growers every year. When frequent blowing rains occur the disease becomes widespread and causes severe losses. Many fields have suffered from 50 per cent to total loss of the crop. Since numerous seed treatment experiments failed to give adequate control of the disease, it seemed advisable to locate an area from which blight-free seed could be secured.

Through correspondence with plant pathologists in California and in the U. S. Department of Agriculture who had observed bean fields in California, it was learned that no bacterial blight had been observed in the Sacramento Valley. In 1936, arrangements were made to have a small amount of bean seed increased in California and shipped to Louisiana for trial plantings. Two hundred pounds of seed was received in the spring of 1937 and distributed in 10-lb. lots to farmers throughout the bean growing area. These plots were examined 3 times during the growing season and in isolated plantings no bacterial blight or anthracnose was found. In 1938 the varieties Bountiful and Sure Crop Wax were also increased in California for trial purposes. In the spring of 1939, 2800 lbs. of Giant Stringless Green Pod, 400 lbs. of Sure Crop Wax, and 700 lbs. of Bountiful seed were received for planting. Several farms which were planted entirely with this seed were observed several times during the season and no bacterial blight or anthracnose was observed. The seed production in California has continued to expand as follows: 1940—25,600 lbs; 1941—40,000 lbs; 1942—50,000 lbs; 1943—104,300 lbs; 1944—153,500 lbs. The varieties Black Valentine, Bountiful, Sure Crop Wax, Davis Wax, and Giant Stringless Green Pod are being produced, and on the numerous farms planted entirely with these seed, no anthracnose or blight has been observed.

Poultry Research

* * *

Low Cost Poultry Houses are Tested in North Louisiana

C. W. Upp, J. L. Heath and D. M. Johns

A well made board and batten house with a good concrete floor was the most desirable of those tested at the North Louisiana Station. It was best from the standpoint of more uniform temperature and lower humidity. The concrete floor made it much easier to clean and to keep the rats out, and insured the safety and comfort of the chickens. A house with sawmill slab walls and dirt floor (cost about one-third that of house mentioned above) was also quite uniform in temperature and was satisfactory for hens, but the dirt floor made it impossible to keep out the rats. This may make a low cost house expensive because rats eat and spoil a lot of feed. A concrete floor $1\frac{1}{4}$ to $1\frac{1}{2}$ inches thick was placed in this house last fall and is now under test.

A house with stuffed straw walls was coldest (minimum daily temperature) during the winter but did not vary as much in temperature as did a house with shiplap walls. The house with shiplap walls and a double wood floor was the most variable in temperature and had the highest humidity. This house sets up off the ground about a foot and was not closed (except with wire) between the floor and the ground.

A "dirt-cement" floor two inches thick, after packing, was laid in the straw house. It has been in use for about five months and shows real promise. It is standing up well. Subsequent reports will be made after it has been in use longer.

Simplified Feeding Yields Fewer Eggs but is Satisfactory in Emergency Period . . .

C. W. Upp, J. L. Heath and D. M. Johns

At the North Louisiana Station four rations and methods of feeding hens were tested last year. Egg production was about the same in lots of hens given (1) a "complex" mash with limited grain; (2) a 32% protein supplement with corn and oats available at all times and (3) a simple laying mash (soybean meal the only source of protein) with limited grain. The eggs from the first two pens hatched better. A fourth lot fed a simple mash (cottonseed meal the only protein) with limited grain did not lay as well as the other three groups but well enough to return in

ten months $1.00 per hen over feed cost. The soybean meal mash pen produced eggs at lowest cost and yielded the greatest margin over feed cost of the four rations used. This experiment, and a similar one at the main station, demonstrate that "simple" rations and feeding methods can be used with satisfaction when a variety of feedstuffs is not available. It should be stressed, however, that good green feed was available for all pens throughout the year.

Rations and Methods of Feeding in War-Time . . .

C. W. Upp, B. A. Tower and H. E. Hathaway

Since many feedstuffs are scarce the conservation of feeds and the use of simpler rations have received much attention. As an example of what can be done, the provision of tender green feed crops at all seasons of the year is possible and practical in Louisiana. In our experiments with hens fed laying mash with only one source of protein *all pens are provided with green feeds* in alternated double yards. Louisiana farmers can do much toward overcoming the limited feed supply by providing green feeds throughout the year.

In six pens of hens the following rations were used: (1) as a check ration a complex mash (i.e., with several sources of protein); a limited amount of grain (corn and oats) was fed in pens 1, 2, 3 and 4; (2) a shrimp meal mash, (3) a peanut meal mash, (4) a cottonseed meal mash, (5) shrimp meal (alone) and corn and oats before the birds at all times, and (6) a 32% protein supplement and corn and oats, all fed ad libitum. The latter two pens were used primarily as labor savers. The "complex" mash pen laid best and the 32% supplement group next. The hens on the other rations laid two to three dozn eggs per hen less in ten months. However, the lowest producing lots laid twenty to thirty percent more eggs than the average farm flock lays. These results of one year indicate that while hens likely will not lay as many eggs when given only one source of protein yet they will lay profitably on the simpler rations. The margin over feed cost varied from $1.00 to $2.00 per hen when local feed costs and average farm prices of eggs were used.

Better Breeding Stock for Louisiana Farms . . .

B. A. Tower and C. W. Upp

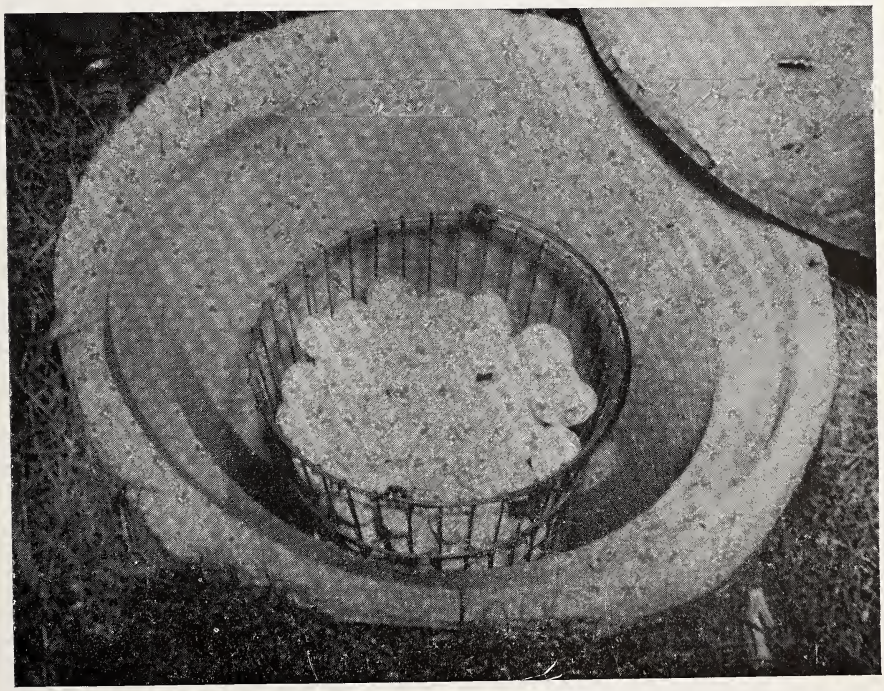
The benefits of the Breeding Project are becoming evident throughout the state. More than a dozen breeders have started Record of Performance work at home. Six certified hatcheries are now in operation in Louisiana. While the individual R.O.P. flock owners and certified hatcherymen deserve credit for establishing these progressive enterprises, their interest was aroused by the Project and in most cases direct help has been given to them by the Breeding Project. The greatest benefit, how-

ever, is to the thousands of chick purchasers; i.e., farm flock owners, who are enabled to purchase chicks of better quality.

It is conservatively estimated that the Breeding Project now returns each year at least $200,000.00 additional income to Louisiana farmers. Since the effects of good breeding are in general cumulative, it is probable that the project has meant more than one million dollars to farmers of the state in its three and one-half years of operation. During the present hatching season approximately 10,000 R.O.P. chicks are being hatched to meet the demands of Louisiana poultrymen. In addition many certified chicks are hatched and sold upon request.

Farm Egg Coolers . . . C. W. Upp, B. A. Tower and H. E. Hathaway

Eggs held for one week in a refrigerator at about 55°F. were of much higher quality than those held in farm egg coolers, as might be expected. The temperatures at which farm egg coolers of various types (without refrigeration) were maintained were considerably above the "safe" temperature for market eggs, but eggs held in them were consistently of ap-



One of the simplest and best farm egg coolers now under test. Made of 18-inch tile set vertically into the ground and located in a shady spot. Note the insulated lid.

preciably better quality after one week than similar eggs held at room temperature. The daily maximum temperatures of the egg coolers, with eggs in them, averaged 10° to 12° below outside temperatures in June and July.

The largest temperature differentials occurred during periods in which high temperatures persisted for several days. In these cases the difference was 12° to 15° in favor of the coolers. This is the time of greatest need for the coolers and the time in which the greatest benefit was obtained from them. The fact that high temperatures were avoided was highly satisfactory. Further improvement can be made, however, in lowering the temperature within the coolers during the night. The minimum temperature outside commonly dropped 5° to 8° lower than the minimum temperature within the coolers. The burlap evaporator cooler was an exception. It followed more closely outside temperatures at all hours of the day and night. Due to the crowded condition of refrigerator space available it was not possible to place any of the eggs in cold storage to determine after effects, if any, of holding market eggs in the coolers. This will be done this summer.

One of the all around most satisfactory egg coolers was the vertical tile sunk vertically into the ground, in a shaded place.

Dried Muskrat Meal for Poultry . . .

O. E. Goff and C. W. Upp

Many potential poultry feedstuffs peculiar to Louisiana are lost each year. With the present wartime shortage of all feeds and with the possibility of finding a protein-rich feedstuff for poultry a study of dry rendered muskrat carcasses was undertaken. Through the cooperation of officials of the Louisiana Furs, Inc., fresh muskrat carcasses were collected. The stomach and intestine of each muskrat were removed, leaving the other internal organs in the carcass. Musk glands, which usually adhered to the pelt, were removed if they remained attached to the carcass. The carcasses thus prepared were kept under refrigeration, except when in transit, until they were dry rendered. Rendering was accomplished at the Swift and Co. Plant at Lake Charles.

A total of 2287 pounds of dressed muskrat carcasses was secured. The carcasses averaged approximately 1.5 pounds each. The yield after dry rendering and pressing was: Pressed tankage 29.29%; Grease 1.18%; Foots .18%. Thus 69.35% of the fresh product was moisture. The grease appears to be satisfactory for industrial use. The yield of pressed tankage closely approximates the yield from domestic beef scrap which is approximately 30%.

After grinding, the dried muskrat meal as analyzed by the Louisiana State Experiment Station Feeds Testing Laboratory contained 62.25% crude protein, 8.09% fat, .37% nitrogen free extract, .95% crude fiber, 6.61% water, 21.73% ash, 3.7% phosphorous and 6.9% calcium.

This product is a feedstuff high in protein. The feeding value and the effect of the product on the chick is being investigated. Obviously, an efficient and commercially economical means of securing this material from the marshes of Louisiana must be developed, if the dried muskrat meal proves to be of sufficient value to justify it.

Effect of Sulfur on Growth and in Parasite Control . . .

O. E. Goff

This year the use of sulfur was divided into three major phases. One phase involved the production of broilers under range conditions; a second phase was a study involving sources of vitamin D for rations containing sulfur, while the third phase was a study of the effectiveness of sulfur in lice prevention and control.

Coccidiosis was prevented in colony-started chicks for the first four weeks by keeping chicks confined to the houses and by maintaining desirable sanitary conditions. Lots of chicks fed sulfur and charcoal, as a coccidiosis preventive, suffered less mortality and produced more pounds of poultry meat than did chicks that failed to receive sulfur and charcoal in their ration, until after the first symptoms of coccidiosis were observed, or those receiving the basal ration throughout the 12 weeks of these trials. Lots that received three percent tobacco dust in the ration harbored fewer round worms than those chicks that did not receive tobacco. February started chicks were appreciably larger at 12 weeks of age than those started in June.

In laboratory trials it was found that fish liver oil and activated animal sterol (Delsterol) and a dry vitamin concentrate (Ration-ayd) were satisfactory sources of vitamin D. However, chicks reared out of doors and having access to direct sunshine made better gains than chicks kept indoors in the absence of direct sunlight. Even though these trials were conducted during rainy, cloudy weather when the sky was overcast, an ample supply of ultra violet rays was available to produce desirable growth and bone formation in chicks grown outdoors.

Body lice on mature hens were controlled by dusting chickens with 325 mesh dusting sulfur or by broadcasting sulfur over the litter at the rate of 2 to 4 pounds per 100 sq. ft. of floor space and by placing a handful in each nest. When sulfur was added to floor litter each time the

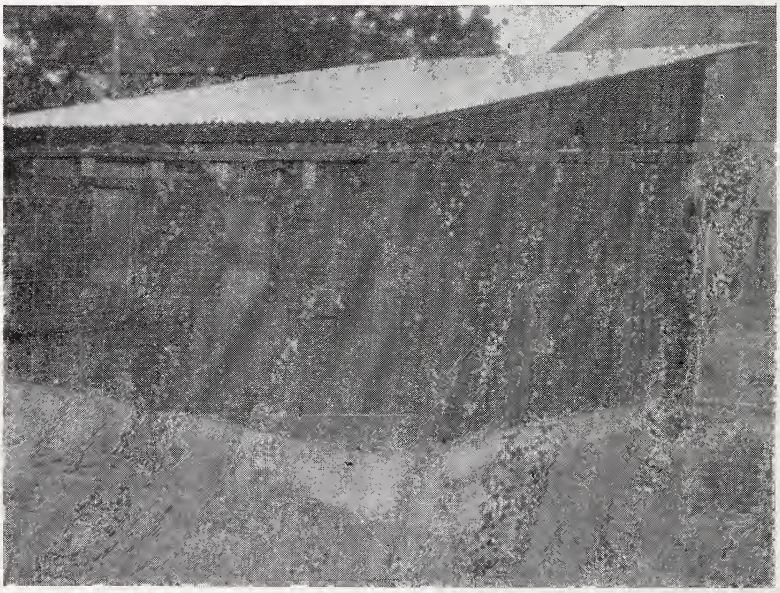
litter was changed, body lice failed to appear (litter was changed at from 4 to 6 weeks intervals). The prevention and control of chicken lice by applying sulfur to the litter and nests was economical and required less labor than individual treatments usually employed.

Low Cost Poultry Houses . . . O. E. Goff and C. W. Upp

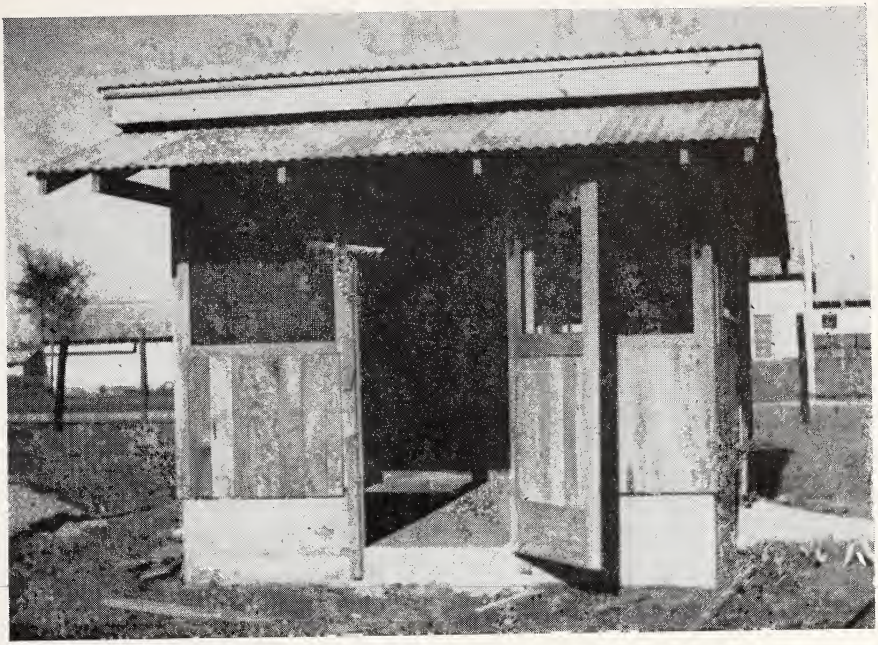
In this year's study it was found that a floor made of sawdust and cement remained too damp for a desirable poultry house floor. A floor on which waste oil was sprinkled was discarded, as it soiled the plumage of the hens when numerous dust wallows developed.

A poultry house, the walls of which are made of burlap bags and cement, has given desirable service for three winters, but will need to be replaced before another season. A laying house, with walls made of sawmill slabs is giving as satisfactory service as a more expensive house of boxing and batten construction.

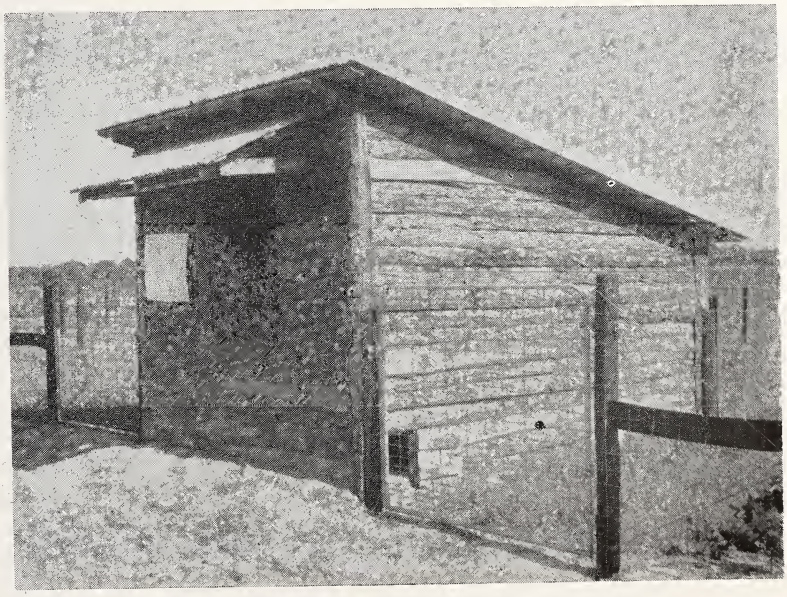
Additional information is being collected on floors made of gumbo, clay loam, cement-dirt, black-top (bitumals), and a floor of concrete approximately one inch thick.



An experimental low cost 10′ x 12′ colony house with dirt floor. Cost of materials when built $23.00. A concrete floor $1\frac{1}{4}$ to $1\frac{1}{2}$″ thick was placed in this house in the fall of 1943. This is now a good house. It has a pine pole frame and sawmill slab walls.



A good permanent 10′x12′ colony house with concrete floor. Cost of materials when built, $90 to $100. All exposed wood is cypress. Concrete foundation built well above ground level to prevent walls from rotting next to ground.



Rear view of a 10′ x 12′ boxing and batten colony house with concrete floor. Cost of materials when built $73.00.

Rural Sociology

* * *

Military Service and Migration to Industry as Factors in the Labor Shortages in the Sugar Cane Belt Since 1940 . . . Roy Hyde

Spot studies of this problem reveal the following: 1. Since most whites in these areas, even when living in the open country, are classified as non-farm, they have not been eligible for agricultural deferment. Consequently, in filling quotas from local man-power pools, every available white man without dependents had to be called. Many of these whites represent a definite loss to the farm labor supply, since they worked occasionally in agriculture and very often in closely related occupations.

2. Negroes of draft age have remained in the rural community much more frequently than whites, because (1) they are far more likely to have an agricultural occupation and to be eligible for deferment, (2) they are much more likely to be classified as 4-F when examined, (3) they are much less likely to have dependents and, therefore, must rely upon agricultural deferment, and (4) if they leave agriculture, they know the planters must inform the draft board. Those Negroes of draft age who are never examined and, therefore, not classified as 4-F, tend to remain in agriculture.

3. Whites and Negroes who, because of dependents or other known causes, were secure from the draft, have felt free to migrate to war industries. This has been an important drain on farm labor, since it has been impossible to compete with industrial wages.

4. The planters have had to rely primarily upon (1) males too young or too old for the draft, (2) females, and (3) Negroes who were either deferred or classified as 4-F. The 4-F group cannot be counted on to any great extent, for they have been unimpeded in changing occupations. Negro females, too, are migrating to the towns and cities in considerable numbers where they accept jobs in industrial plants or as domestic servants.

5. Resulting critical labor shortages on some of the larger plantations have been partly offset by greater use of machinery, especially in harvesting, and by limited use of war prisoners. There has been no relief for smaller operators, and none appears likely.

6. Informed planters are of the opinion that if the indispensable labor is to be retained, farm deferment must be continued. Furthermore, they feel that the unit basis of deferment is not satisfactory—that the operator of a small farm should be entitled to deferment.

The Educational Preparation of Louisiana's Farm People

Bardin Nelson and T. Lynn Smith

This is timely for as the results of the 1940 Census are tabulated it becomes possible for the first time to determine the extent to which the school systems of the various states have been effective in giving formal education to their inhabitants. Previously only the data on ability to read or write have been secured; but in the latest census the amount of schooling secured by the population past school age was gathered and tabulated. These data offer an invaluable mine of information concerning one very important qualitative feature of the population. During the year some work has been devoted to a determination of Louisiana's standing among the states and to an analysis of the variations in the educational status of the population within the State.

Louisiana's farmers have secured far less formal education than has been provided to the village, suburban, and urban portions of the state's population. Thus the median number of years of schooling secured by the native white population resident on farms is only 6.3, while in rural-nonfarm areas the comparable figure is 8.1, and in urban areas 9.1. Similarly, among Negroes the median years of schooling increases from 2.8 on the farms to 3.5 in rural non-farm areas, to 5.2 in urban districts.

The rural-farm population of Louisiana occupies a very unenviable position when compared with similar populations in the other states of the Union. Thus the white rural-farm population of our state ranks below that of every one of the other 47 states in average (median) amount of schooling obtained; the Negro rural-farm population of Louisiana also stands at the very bottom of the array. To the extent that the quality of the farm population is determined by the amount of formal schooling obtained, it must be recognized that our rural population fails to measure up with that of the other states in the Region and in the Nation. In Louisiana, native white farmers 25 years of age and over have received an average of only 6.3 years of schooling, while the national average is 8.0. Among Negroes the comparable percentage is only 2.8 in Louisiana compared with 4.1 for the Nation. The states which rank nearest Louisiana in this respect are the others which lie in the Southeastern Region.

Not only does the farm population of Louisiana rank below that of all other states from the educational standpoint, but this situation is being perpetuated. The state is gaining on the national average, but as yet it has not overtaken any of the states. Thus if only the farm people aged 20 to 24, 25 to 30, or 30 to 34 are considered it is found that Louisiana's white population, and also her colored, rank below all other states in the average number of years of schooling acquired. In 1940 more than one-half of Louisiana's farm people aged 25 to 29 had less than six years of schooling, while in the Nation as a whole even those

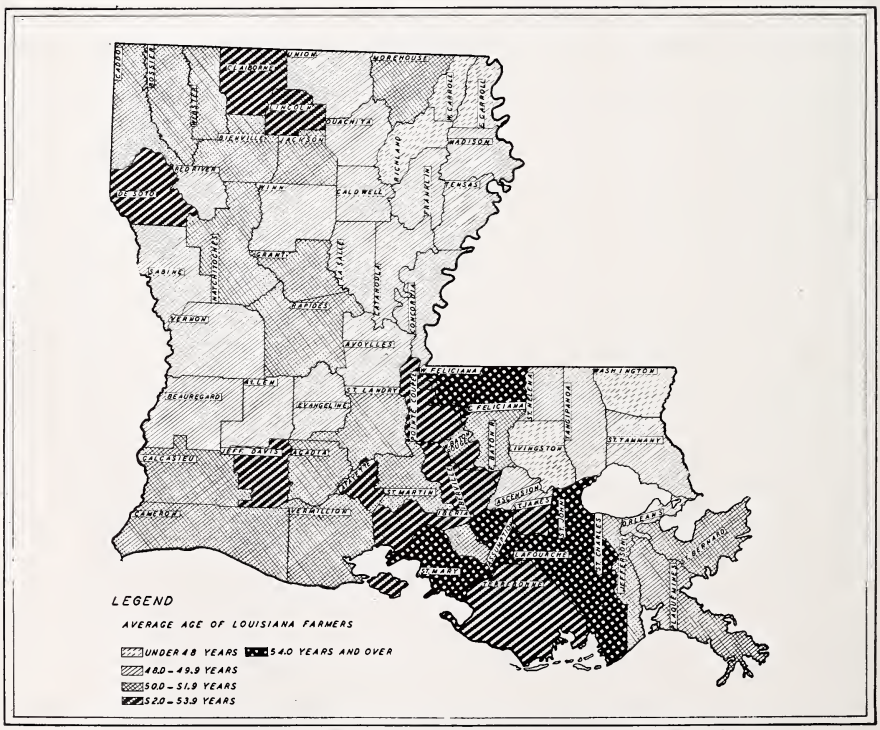
aged 70 to 74 had an average of seven years of formal schooling. Thus our state seems to have given our newest group of farmers and farmer's wives less educational preparation than the Nation in general was giving to its farm citizens some 45 or 50 years ago. If present trends continue it will require some 50 years for Louisiana to equal the national average.

The Ages of Louisiana's Farm Owners . . .

T. Lynn Smith

Although this aspect of the study has not been carried very far, it now is clear that the state's farm lands are now being operated by farmers who are much older than those of any other epoch in Louisiana's history.

During the last 40 years the age of Louisiana's farm owners has increased by leaps and bounds. In 1910 only 9.6 percent of those classed as full owners were 65 years of age or over. By 1930 the corresponding percentage was 13.8, and by 1940 it had risen to 16.5. On the other hand, in 1910 some 23 percent of those Louisiana operators who owned all their farming land were less than 35 years of age. But by 1940 only 15 percent fell in this younger age group. Louisiana farm owners averaged 50 years of age in 1940. Even this is below the average for the Nation which was 52.8 years. Since 1940 the average age of farm owners probably



VARIATIONS IN THE AVERAGE AGE OF LOUISIANA FARMERS' FULL OWNERS, 1940

has increased considerably. These facts are of not a little significance in connection with any provisions that may be made by the State Legislature and the National Congress to assist ex-soldiers in establishing themselves on the land.

Naturally, the age of farm owners varies widely from one part of the state to another, and among the various types of farming areas. To make readily usable the available data on this subject, Figure 1 has been prepared. On a parish basis, it brings out the essential differences in the state.

Health and Mortality of the Population of Louisiana . . .

Louise Kemp and T. Lynn Smith

For this part of the project, which is designed to throw light on the state of health of Louisiana's population, data have been assembled which permit comparisons of rates of mortality in the state with those in the United States for the period 1925-1940 for "all" and for "specific" causes of death. An attempt has been made to determine what variations in mortality characterize the different racial and the rural and urban groups within the state. Materials on infant and maternal mortality for the 15-year period have been analyzed for the state and nation and for the racial and residential groups within the state.

The trend in the general death rate has been downward in both areas, with the most pronounced reductions in rates from the communicable or preventible diseases. Rates from these causes were still higher in Louisiana in 1940 than they were in the country as a whole in that year. The degenerative diseases, or those associated with older age groups in the population, increased in importance as causes of death in both areas over the period, and rates of death from these causes were, in general, higher in the nation as a whole than in the state in 1940.

Within the state, much of the improvement was due to the lowering of Negro death rates, and especially those from communicable diseases. Even so, this race was characterized by a general death rate which was one and one-half times as high as that of the white population of the state in 1940.

There are some indications that rates of mortality are higher in the larger centers of population in the state than they are in the rural areas, but further refinement of the data is necessary before the generalization can be accepted as valid.

Although Louisiana has reduced its rates of infant and maternal mortality in the past 15 years, it still occupies a low relative position in this respect when compared with the nation as a whole. Rates of infant mortality are particularly high for the Negro populations of the cities of the state, where almost one in every ten Negro infants dies before it reaches the age of one year.

Seed Increase Work

W. J. Andrews

* * *

Corn . . . .

Hybrid Corn. Five hundred fifty acres of Louisiana hybrid double-crossing corn plots were planted for seed production in 1944. This will produce a sufficient amount of hybrid seed to plant 110,000 acres in 1945, which is quite an increase over 30,000 acres planted to hybrid corn in 1944. Hybrid corn increases the yield on the average in Louisiana of ten bushels per acre over the open-pollinated varieties, and with 110,000 acres planted to hybrid corn in 1945, this will give an increase in yield of 1,100,000 bushels. In 1944, seventy-five acres is to be planted for single crossing, which should produce a sufficient amount of seed to plant 1500 acres for double crossing plots in 1945.

Regular Variety of Corn. Five foundation stock seed growers are working under our supervision in the improvement of the five best adapted varieties of open pollinated corn, in order to furnish the stock seed of these varieties to certified seed growers.

Soybeans . . .

L-Z Variety. One hundred bushels of the L-Z variety of soybeans were released by the University Seed Board for increase production. This will plant 400 acres of soybeans for foundation stock seed to be used in 1945.

Acadian. Two hundred fifty bushels of the Acadian variety of soybeans were released by the University Seed Board for increase purposes to produce foundation stock seed in 1945. This will plant 1000 acres and should produce a sufficient amount of seed to plant the acreage needed in this variety in the soybean producing area. Both the Acadian and the L-Z varieties are outstanding due to the fact that they will not shatter while in the field. This is very important, because at times farmers cannot harvest their soybeans until the latter part of December.

Pelican. One thousand bushels of the Pelican variety of soybeans that were released in 1943 is being increased in 1944. This is planted on 4000 acres, which will produce a sufficient amount of seed to plant all of this variety needed in 1945. Farmers in Central Louisiana, who planted this variety in 1943, found it to be far superior in practically all cases to the beans they were growing. These varieties give excellent coverage, with

more growth than the Avoyelles variety; in addition they give approximately ten bushels higher yield per acre when harvested for seed than does the Avoyelles variety.

Nela and Mamotan 6680. Three hundred seventy-three bushels of the Nela soybean, which has proven an especially good bean for North Louisiana, are being increased in 1944. One hundred bushels of Mamotan 6680 was planted for increase purposes in 1944.

Oats . . .

Camellia (La. 629). Five thousand acres of Camellia oats were harvested, producing about 175,000 bushels in 1944, which is a sufficient amount of seed to plant the acreage needed in Camellia oats in Louisiana. This variety has proved to be the outstanding oat in South Louisiana.

Cotton . . .

Station Miller 919. One hundred acres is being planted to Station Miller 919, which was released by the Experiment Station. This is a selection out of Station Miller. The staple length is one thirty-second inch longer than on the regular variety of Station Miller. It has also given an increase in production. The seed production on this 100 acres will all be used as foundation stock seed.

Dixie Triumph 366. One hundred fifteen acres is being planted to Dixie Triumph 366 for increase purposes.

Dixie Triumph 366-789. This is a selection out of Dixie Triumph 366. Five acres will be planted under supervision for increase purposes.

Louisiana Sweet Corn. Forty acres were planted to Louisiana sweet corn strains No. 1 and No. 2 for seed production.

Sugarcane

* * *

Varieties . . .

E. C. Simon, S. H. Smith and F. W. Berthelot, Jr.

The variety C. P. 34-120 reported on in the 1941-1942 annual report, which was released for commercial cultivation during the fall of 1942 is gaining rapidly in popularity and was extensively planted last fall throughout the entire sugar district of South Louisiana. The variety, barring any unforeseen circumstances, seems destined to rapidly become one of our main field varieties.

Two new sugarcane varieties were released for commercial planting in the fall of 1943, namely C. P. 33-310 and C. P. 33-425. These varieties have indicated sectional and not general adaptability and it is expected that each will find a place in those sections in which it is adapted. C. P. 33-310 has shown much promise as a comparatively early maturing variety on some of the soil types in the Western and Teche Sections. C. P. 33-425 has shown promise on some of the soil types in the Red River Section where it has been high in sucrose content and comparatively early in maturity.

At the present time we have under close observation and test two very promising varieties, C. P. 36-105 and C. P. 36-13. Both of these sugarcanes are now on our eight Experiment Station test fields; C. P. 36-105 which has been on our test fields for several years and is now on our primary and secondary increase stations has a growth type well adapted to mechanical harvesting in addition to many other desirable characteristics. The variety C. P. 36-13 was sent to our test fields last fall and will be under observation and test for the first time this year. For several years in our windrowing tests at the sugar station it has ranked superior to our present windrowing variety Co. 281 from the standpoint of loss in sucrose content through inversion. However, additional information must be secured as to its physical characteristics for windrowing before we will be in a position to state definitely that the variety is that sugarcane which we have been seeking as a replacement for our present standard Co. 281.

Soil Management . . .

E. C. Simon, S. H. Smith, and F. W. Berthelot, Jr.

We have little to add to our rotation data given in the 1941-42 annual report except that our findings justify the statement that good field practices are necessary in order to secure maximum crops from the use of legumes and commercial fertilizers. Our cultural practices are being improved, and last year during the last cultivating season we adapted two

light one-mule cotton implements, the light springtooth cultivator and the large buzzard-wing cotton sweep, to the cultivation of sugarcane. It has been possible to use a combination of these two tools, modified somewhat, for the killing of young grass in the sugarcane middles and along the sides of the rows. In addition the use of these tools would greatly reduce the amount of hand labor that often has to be used to destroy late grass and weeds after lay-by. This has been done without injuring the root systems of the sugarcane plants. Our results have been very satisfactory and this year we expect to modify the two tools further and make others of our own design in order to improve the quality of this type of cultivation.

Sugar Cane Test Field Work . . . C. B. Gouaux

Judging from the results secured on the test fields in 1943, varieties C. P. 28-19 and C. P. 29-320 in the Mississippi River and Red River sections and Co. 290 and C. P. 29-116 in the Teche and western sections are continuing to make profitable crops, but other varieties developed at a later date are proving to be capable of producing more sugar per acre. This finding clearly emphasizes the importance particularly of such canes as C. P. 34-120, C. P. 29-120, and C. P. 33-243 when these varieties are planted on the better lands. With C. P. 34-120 as a yardstick for measuring the productive capacity of other varieties, there is no released or unreleased variety at the test fields that can make more sugar per acre over a wide range of territory. This cane shows excellent results on Yazoo and Sharkey soils at Cinclare, on Yazoo soils at Glenwood and Reserve, on Yahola soils of the Red River and on the rolling soils of the western section. It gave excellent yields of plant cane, and first and second stubble, and showed good adaptability to all of the various soil types.

The variety C. P. 33-243 showed up well at Cinclare, Shirley, Meeker, and Billeaud test fields when planted on the light, fertile, and better drained lands. On such lands, it can be used to advantage over C. P. 29-103 and C. P. 29-120.

C. P. 29-120 showed definite superiority over C. P. 29-103 at Cinclare, Glenwood, and Reserve.

The average plant cane and first stubble results of the Billeaud field indicate that seven of the varieties, when considered from the sugar yield standpoint, rank in the following order: (1) C. P. 33-243; (2) C. P. 34-120; (3) C. P. 34-21; (4) C. P. 31-509; (5) C. P. 33-310; (6) C. P. 29-116; (7) Co. 290.

Unreleased varieties which are worthy of close study are: C. P. 31-509, C. P. 34-21, C. P. 34-92, C. P. 34-115, C. P. 36-19, C. P. 36-85, and C. P. 36-105. Of these canes, information to date indicates that C. P. 36-19, C. P. 34-92, and C. P. 36-105 are the most desirable, particularly on account of their adaptability to mechanical harvesting. C. P. 31-509, which is a particularly hardy cane, and C. P. 34-21 are good canes but are probably undesirable for mechanical harvesting.

Veterinary Science

* * *

Internal Parasites of Workstock . . .

A. H. Groth and Gifford Hargis

Workstock, now more than ever should be maintained in thrifty condition to insure proper utilization of feed which is often scarce, and to give the maximum number of hours of work in crop production. To do this, horses and mules must be relatively free from internal parasites, some of which suck blood, while others interfere mechanically with digestion and absorption.

Drugs, such as carbon disulfide, that is effective in removing bots from the stomach and large round worms from the small intestines, and phenothiazine which is effective in removing small round worms from the large intestines, are available. However, most of our work animals are infested with some parasites in all parts of the alimentary canal.

Many farmers will treat horses and mules once a year, but few of them will treat their animals twice a year. In an effort to make one treatment effective against parasites in the stomach, small intestines, and large intestines, experiments are in progress to test the combined effects of carbon disulfide and phenothiazine. Results to date seem to indicate that this combination has distinct possibilities. The animals that have been treated with carbon disulfide and phenothiazine, given at the same time in capsules, did not show any ill effects and large numbers of bots and small round worms were removed. The general condition of the mules improved and they all gave very good service in heavy farm work; however. more animals must be treated before definite recommendations are made.

Johne's Disease (Paratuberculosis) . . .

A. H. Groth and C. H. Staples

Johne's disease, or paratuberculosis, is a chronic condition characterized principally by inflammation of the intestines, loss of condition, and diarrhea. It attacks cattle and sheep and has been reported in goats, deer, and horses. According to present knowledge, man is not susceptible.

The cause of Johne's disease is a germ named Mycobacterium paratuberculosis, which is usually found in scrapings from affected parts of the membrance lining the intestines and in lymph glands along the intestinal tract. The germ is passed in the droppings of infected animals

and may be consumed by susceptible ones in feed and water that has been contaminated by droppings. In most herds the disease spreads slowly and several months to several years may pass before infected cattle show clinical symptoms.

Probably the ordeal of freshening makes an infected cow more susceptible to the effects of Johne's disease, for clinical symptoms often appear for the first time within two to six weeks after calving. In some cases the diarrhea may disappear for a time, only to recur later. This may be repeated several times before the animal finally succumbs.

Diagnosis of Johne's disease is often difficult. However, the use of a diagnostic agent is giving encouraging results. This station is cooperating with the Regional Animal Research Laboratory, Auburn, Alabama, in tests with Johnin produced at that laboratory.

No satisfactory method of treatment for Johne's disease has been found. Control and eradication according to present knowledge should be along the same lines as used to combat tuberculosis. It is probable that the disease is more widespread than is generally known and cattle owners who may suspect the presence of Johne's disease in their herds should communicate with their Livestock Sanitary official.

Vaccination of Adult Cattle Against Brucellosis with Strain 19 Vaccine . . . A. H. Groth and S. E. McCraine

The successful immunization of four- to eight-month old heifer calves against brucellosis has led to increased interest in the possibility of similar immunization of adult cattle. One serious objection to vaccination of adult cattle is the persistence of the post-vaccination reaction in adults as compared to calves. In an effort to shorten this reaction period, a dose of 0.2 cc of Strain 19 vaccine has been injected intradermally, instead of the regular 6 cc dose given subcutaneously.

A small herd of purebred cows with a high rate of infection and abortions was vaccinated intradermally in February, 1943. All animals that were negative at the time of vaccination have been consistently positive when tested at monthly intervals. Animals positive at vaccination are still positive. During the first year after vaccination, there has been no appreciable increase in the percent of live calves dropped in the herd.

Anaplasmosis in Cattle . . . Paul L. Piercy

Young cattle are often only mildly affected by attacks of clinical anaplasmosis and usually recover; physical evidence during the clinical stages of the disease in such animals may be so mild as to pass unobserved. The malady is often fatal to adult cattle and in them is rarely so mild as to pass unobserved. During clinical manifestation, small dot-like

bodies, the causative agent (*Anaplasma marginale*), are found in the red blood cells of affected animals. These bodies greatly facilitate diagnosis during the relatively short period of clinical anaplasmosis; but when, and if, recovery takes place, they are no longer demonstrable in the blood and thus lose their diagnostic significance. Recovered animals are called "carriers" because their blood is infectious and capable of reproducing anaplasmosis following inoculation into susceptible cattle.

Inoculation of infective blood can be accomplished in numerous ways by either natural or controllable artificial agents. The transmission by the latter agents results from inadequate cleansing and sterilzation of instruments used in vaccinating, castrating, dehorning and other common surgical procedures followed on farms and ranches in the absence of qualified veterinary service. Every precaution must be taken to avoid transfer of even small amounts of blood from animal to animal by being sure that instruments are thoroughly cleansed and disinfected following operative procedures on each individual animal. Preventive or curative measures of specific nature are impractical or unknown for controlling anaplasmosis at the present time.

When clinical anaplasmosis develops in inoculated animals, natural agents of transmission can transfer the infection to susceptible cattle with relative ease. These natural agents include several varieties of blood-sucking "horseflies" as probably the most important natural transmission factors in Louisiana. Certain ticks and mosquitoes have been reported as capable vectors in some states and foreign countries where the disease is known to occur.

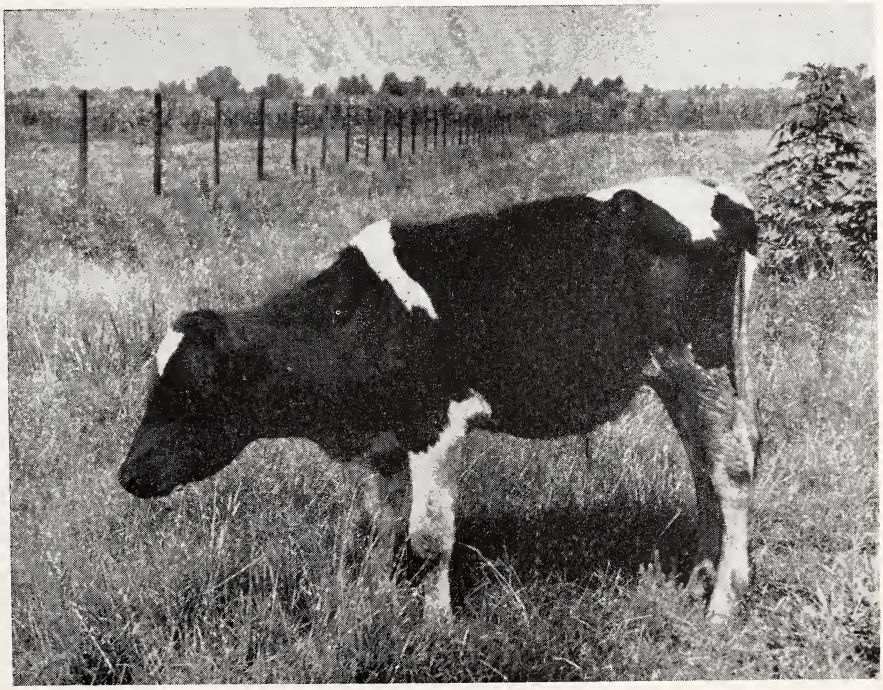
Gastro-Intestinal Nematode Parasites of Cattle . . .

R. L. Mayhew

A study of a poor feed and its relationship to the immunity developed against the large stomach worm (*Haemonchus contortus*) has been made. The calves used in these experiments were secured soon after birth and raised under parasite-free conditions. They were inoculated with pure cultures of infective stomach worm larvae and reinoculated until it was determined that they had a definite immunity established as indicated by a permanently decreased egg count. The animals were then fed cottonseed hulls only until they began to show a definite loss in weight and strength (usually in a month to six weeks); then they were reinoculated with infective stomach worm larvae. There was no evidence of damage due to parasites in any of the six experimental animals and no increase in egg count in three and but a slight increase in the other three animals. The animals became so weak from the small amount of nourishment received from the cottonseed hulls that some died at the end of the

experiment or shortly afterward. These results indicate that the quantity or quality of feed does not cause calves that have an established immunity to the stomach worm to be more susceptible to further infection.

Observations during the past year continue to indicate that considerable damage is done by the larvae during the time between their entrance into the calf and when they become adult worms. The death of six animals has occurred during this period, and five others remained in very poor condition for several months and seven either failed to gain or gained less than half the expected gain in weight during the larval period. The accompanying photograph is of a calf that lived seven months after a severe attack of parasitism during the larval period and remained in poor condition during this time, death finally being the result. Blood counts indicated that a severe anemia develops during this period. These observations indicate the difficulties encountered in diagnosis since adult worms are not found at postmortem and eggs are few or lacking when the manure is examined microscopically. Treatment is probably of no value when the parasites are in this stage of development.



Photograph of a calf which showed definite effects of severe parasitic infection during the larval period. The animal survived seven months but remained in poor condition although he was on good pasture and was fed and finally died.

Substations

* * *

Fruit and Truck Experiment Station, Hammond . . .

W. F. Wilson, Jr., Superintendent

STRAWBERRY STUDIES

Effect of Lime on the Production of Strawberries

Applications of dolometic limestone at the rates of 1000, 3000, and 5000 pounds per acre were made prior to the 1937 crop, establishing areas with a range in acidity from pH 4.4 on the normal areas to pH 6.2 on the heavily limed areas.

Average yields from these areas during the seven year period have shown consistent increases with the application of lime. These heavily limed areas produced an average of 48 crates per acre more than the normal areas.

Breeding

As part of the breeding program with strawberries carried on with Dr. Julian C. Miller, the seedlings selected by observation of a few plants the first season are increased and planted in regular variety or yield tests with the Klondike, the standard variety.

For a five-year period the disease resistant new variety Klonmore has produced an average yield of 214 crates per acre in comparison with an average of 209 crates per acre from the Klondike. The recently named seedling, Konvoy, during a three-year period has produced larger yields than the Klonmore but lacks the shipping quality of the other varieties. This variety can be widely used for home gardens and for freezing.

CUCUMBER STUDIES

Variety Test

Earliest and largest yields have been produced by the varieties Straight Eight and Kirby's Stay Green Longstrain. The variety A. C., though producing lower yields per acre is a desirable market variety for this area due to desirable shape and color.

Fertilizer Tests

Fertilizer studies of the formula and rate of application for the economical production of cucumbers conducted over a period of several years have shown the formula 4-12-4 applied at the rate of 800 pounds per acre to be the most profitable practice.

Disease Studies

Disease control experiments with cucumbers were made at the Hammond Station by Dr. A. G. Plakidas and results from these studies were reported by the Plant Pathology Department.

Blueberries (Vaccinium Virgatium)

This station cooperates on a project led by Dr. G. M. Darrow of the Bureau of Plant Industry, United States Department of Agriculture, which includes a number of Southern States, for the development of suitable varieties of blueberries for the south. A number of named selections of Blueberries have been obtained and are being tested. Approximetaly 1000 one- and two-year-old plants of seedlings are included in the planting. These seedlings were obtained from Dr. Darrow and the selection of promising plants, with subsequent testing will be practiced.

Okra Breeding

A large number of strains and varieties are maintained as inbred lines at this station. This program for the improvement of this crop has produced the varieties Louisiana White Velvet and Louisiana Green Velvet which are very desirable varieties of the "Velvet type." "Louisiana green velvet" has proven to be very popular as a home garden variety as well as an excellent variety for canning.

A short, thick pod strain of the type demanded by the market trade is ready for increase and introduction. This strain produces a short, thick, smooth, round pod of a light green color. The pod has very thick walls and holds its shape when cooked. The plants are fairly tall with short internodes, and produce a relatively large number of pods per plant.

The long petioles of this strain prevent the plant from becoming heavy and facilitate harvesting without so much of the usual inconvenience found with this crop.

TUNG STUDIES

In cooperation with Dr. W. D. Kimbrough, the comparison of seedling and budded trees has been carried on at this station. The yields from budded trees have not been as large as from the seedling trees nor has growth of trees been as satisfactory.

North Louisiana Experiment Station, Calhoun . . .

Dawson M. Johns, Superintendent

Agronomy . . . Dawson M. Johns

Cotton

A variety test was conducted as in many previous years in which all the well known varieties of this area were included. Results of this test show, as in most areas where cotton is of major importance, that several

varieties produce good and profitable yields. Due, perhaps, to the unusual dry season, Hi-Bred, a seven-eighths inch staple variety, produced a higher relative dollar value per acre than ordinarily. However, taking into account the production records of previous seasons on Hi-Bred and the lower market value of short staple cotton, this variety can not be generally recommended for the hill area. The results of the test substantiate the continued recommendation of Station Miller for the area. Stoneville 2B and Deltapine produce well and may be grown with satisfaction. Dixie Triumph is recommended for "wilty" soils. Coker's wilt resistant strain is showing promise in this area.

Mention should be made of the new improved selection of Station Miller known as Miller 919 that has been developed here of which approximately 3000 pounds of seed is being distributed to farmers for planting this season under the standards set forth by the Seed Board of the College of Agriculture.

Corn Varieties and Hybrids

The Louisiana Hybrids have produced remarkable yields in contrast with yields produced by the open pollinated varieties of both the prolific and single ear groups. Comparative yields from Variety-Hybrid tests at this Station show that Louisiana Hybrids are especially well adapted to North Louisiana, producing 20 to 30 per cent more bushels per acre than the varieties now being grown. The adoption by farmers of these Hybrids will materially increase the yield and lower the production cost of grain in North Louisiana. The grain quality of Louisiana Hybrids is good.

Corn Fertilizer Tests

Applications of 30 to 40 pounds of nitrogen per acre to corn have produced very profitable yield increases. The nitrogen may be applied in so-called "split" applications—applying approximately half of the nitrogen before planting and the remaining portion as a direct application when the corn plants are approximately knee high—or all the nitrogen when the plants are about knee high. An average increase of 20 bushels of corn per acre has been obtained from an application of 32 pounds of nitrogen tests where the phosphate and potash requirements were provided. Results from experiments now underway definitely indicate that higher and more profitable corn yields can be obtained in the hill area by using phosphate and potash in addition to nitrogen, although nitrogen applied alone is extremely effective in increasing yields. The use of phosphate and potash is more pronounced where high applications of nitrogen are made.

Corn Following Winter Legumes

Corn yields have been increased six to ten bushels per acre by turning under a winter legume before planting corn. These yield increases were obtained following a good early growth of the legume crop. Austrian

winter peas planted early in the fall is the recommended winter legume crop preceding corn.

Oat Fertilizer Tests

Oat yields have been increased more than 90 per cent with spring applications of 32 pounds of nitrogen per acre in tests conducted during the past two years. Oats receiving no nitrogen produced 38.5 bushels per acre, comparable to approximately 19 bushels of corn, and oats receiving 32 pounds of nitrogen per acre produced 75.7 bushels, an increase of 96.6 per cent due to the direct application of nitrogen. Oats receiving 16 and 24 pounds of nitrogen per acre produced 61.4 and 67.4 bushels, respectively.

Devon Cattle Projects

In June, 1943, two heifers and one bull two years old and two young heifer calves of registered stock were purchased as the foundation breeding stock for a small herd of Devons. The Devon is red in color and is known as a "dual purpose" breed. The purpose of developing a small herd of Devons here is to evaluate the merits of this type cattle for North Louisiana conditions. The two older heifers have freshened and are now being milched twice daily. Their milk flow is ranging between 20 and 22 pounds per day. The calves are being fed eight to ten pounds of milk per day and are in good condition. The surplus milk is being used by the laborers on the Station. Approximately 30 acres of open and woodland pasture is being devoted to the project. A small feeding and milching shed was erected in the summer of 1943.

Horticulture . . . P. L. Hawthorne

Tomato Varieties and Strains

Tomato yield tests that include commercial varieties and new Louisiana strains have been conducted on the Station for several years. Of the commercial varieties grown, Master Marglobe and Louisiana Gulf State have given the highest yields. Several of the new strains developed at the Louisiana Experiment Station have out yielded the Master Marglobe by 2000 to 4000 pounds of tomatoes per acre. These high yielding strains show more resistance to cracking under North Louisiana conditions than do any of the commercial varieties tested. This factor is very important to the commercial grower as the average annual loss in the U. S. No. 1 grade of green wrap tomatoes is from 20 to 30 per cent from this type of fruit cracking.

Sweet Potato Varieties and Strains

This test includes the commercially important varieties grown in the South and the better seedlings from the breeding work at the Baton Rouge Station. The Unit 1 Porto Rico is the highest yielding commercial variety.

Of the many seedlings that have been included in the test the 1x6-39-10 is the most outstanding. This is a high carotene potato. It gave practic-

ally the same total yield in 1943 as the Unit 1 Porto Rico. The yields of U. S. No. 1 roots were 30 to 40 per cent higher for this seedling than for Unit 1 Porto Rico. This strain shows good possibilities of replacing the Unit 1 in the hill area. The 1943 moisture analysis run at the University Station, showed that the 1x6-39-10 potatoes grown on the Calhoun Station were lower in moisture and higher in solids than those grown at Baton Rouge or St. Francisville. This analysis indicates that potatoes of this kind grown on hill soil should keep better in storage than when grown on heavier soils that have a higher moisture content.

Outfield Sweet Potato Fertilizer Experiments

Outfield fertilizer tests with Sweet Potatoes conducted during the past year in Bienville, Claiborne and Jackson Parishes have shown that a 400-pound application of 4-12-8 gave highest yields of No. 1 sweet potatoes. Tests conducted on Lintonia soils in West Carroll Parish indicated greatest yields of No. 1 roots may be expected from 400 pounds of 4-12-4 fertilizer.

Breeding of Edible Cowpea

Using the results of variety tests conducted from 1936 to 1940 as a background, an edible cowpea improvement program was started in 1941. Selections were made from seed stocks collected over the south and crosses were made between the more palatable varieties and varieties known to be resistant to cowpea wilt (Fusarium sp) and root knot nematodes (Heterodera marioni Goodey). As a result of the seed stock collection made over the south, a bunch strain of purple hull peas that shows some resistance to wilt but no resistance to nematodes was located in a more or less localized area in and around Jackson parish Louisiana.

Several segregates have been selected in the breeding work that are disease resistant and possess other desirable characters of horticultural and agronomic value. It was found that edible strains and varieties of cowpeas reported to be resistant to wilt and nematodes in other areas were resistant to nematodes but were not resistant to wilt in the heavily diseased plots on the North Louisiana Station. This indicates that there are different strains of the organisms that cause cowpea wilt in the south than are found in other areas.

Watermelon Breeding

This project was initiated to develop wilt resistant varieties to meet market demands and conditions in this area. Discrimination in price and demands for a watermelon variety that combines disease resistance with good shipping and edible quality created a need for varieties that are more desirable than the wilt resistant strains now in commercial production. Crosses were made in 1941 between varieties possessing the desired characters and several strains have been produced that combine disease resistance with desired fruit qualities. These strains are being selected for pure lines and are grown for increase.

Peach Fertilizers

Results of peach fertilizer tests indicate a definite need for a liberal application of a high grade complete fertilizer. The rate of application should be on a graduated scale up to 12 to 15 pounds per tree depending on the tree size. The fertilizer should be applied to the soil around the outer edges of the limb spread. The bearing trees should have a supplemental application of one and one-half to two pounds of nitrate of soda applied in late summer after fruit buds are formed and terminal growth has stopped or about three to four weeks after fruit harvest is complete.

Strawberries

The seedling 122-3 named Konvoy continues to lead all other varieties and strains in total production and length of producing season. It comes into bearing 10 days before and bears about 10 to 14 days longer than the Klondike. Heavier yields can be expected from the Konvoy when the plants are set early in the fall than when set after December 1.

Northeast Louisiana Experiment Station, St. Joseph . . .

C. B. Haddon, Superintendent

COTTON

The following tests have been carried on at this station with cotton: varieties; sources of nitrogen applied two weeks before planting and also as a side-dressing after chopping; cotton following various varieties of winter legumes; cotton following date of turning under vetch; commercial nitrogen as a supplement to vetch; cotton following corn and soybeans handled in various ways; cotton following four varieties of soybeans grown in corn; dusting with various materials to control boll weevil and aphid; dusting at various times of day; and breeding work by the selective method. Results from all these tests may be found in the last report of this station (1941-42).

In the breeding work special effort has been made to improve the production of Delfos 425. This is a long staple cotton with very high resistance to wilt. Its production has not been equal to other strains of Delfos which do not have wilt resistance. From the records for the past three years it appears that some progress is being made, especially with one selection made in 1939, Delfos 425-920. The three-year record for this strain as compared to the parent variety is given below.

	1941	1942	1943	Average Yield	Average Length	Aberage % Lint
Delfos 425	1173	2083	2503	1919.6	$1^{1}/_{8}''$	32.26
" 425-920	1261	2224	2735	2073.3	$1^{5}/_{32}''$	32.53

A small quantity of Delfos 425-920 seed will be available in 1945 to farmers who wish to grow a long staple cotton on wilt infested land.

In the test where cotton follows corn and soybeans handled in various ways some very outstanding results have been obtained. This test has been conducted seven years and the results are given below.

Plot Treatment	7 Yr. Av. Yield	7 Yr. Av. increase
Corn alone—check	998	...
Corn and soybeans, cut for hay, stubble turned under in fall	1627	629
Corn and soybeans, cut for hay, stubble turned under in spring	1557	559
Corn and soybeans, all turned under in spring	1837	839
Corn and soybeans, all turned under in fall	1984	986

No commercial fertilizer is used on this test at any time. The most outstanding feature of this test is the fertilizing value of soybeans on Delta soils where a good stand is grown in corn. It is also shown that, while considerable loss occurs when the beans are removed from the land, there is still a profitable increase in cotton obtained from the bean stubble and roots. It is very clearly shown that good yields of cotton can be maintained from the two-year rotation of corn and beans followed by cotton.

Tests are made each year with all the leading varieties of open-pollinated corn grown in this section. In addition to these, tests are made with the Louisiana bred hybrid strains and many hybrids developed by commercial breeders. Other work with corn includes fertilizer tests, corn following legumes, etc.

Work with small grains includes variety tests, fertilizers, rate of seeding, date of planting, etc. One very interesting test with small grains is the "clipping test." Since the plots cannot be grazed the clipping is done three times during the growing season to study the effect of grazing. The clippings are caught and weighed to determine the amount removed. After the last clipping, about March 1, certain plots are top-dressed with 30 lbs. of nitrogen per acre. The three-year average results of this test are shown below.

Grain	Lbs per acre clipped	Yield in Bushels per acre			
		clipped		unclipped	
		Fertilized	Unfertilized	Fertilized	Unfertilized
Oats	8322	62.1	41.5	90.5	57.9
Barley	2860	38.4	29.5	47.0	33.6
Rye	3612	30.1	19.6	40.0	30.9
Wheat	4027	21.5	17.4	28.6	25.3

As shown above, there is considerable loss in all the grains from clipping. In grazing this loss would probably be more, due to the trampling effect of cattle. There are times, however, when it is necessary for the farmer to graze his small grain on account of feed shortage. In this test it is shown that this may be done to a certain extent and the yield brought up by the use of fertilizer to about equal the ungrazed and unfertilized grain. It is largely a question as to whether the farmer needs the grazing early in the season more than the grain later. Unless there is a very definite feed shortage the grain should not be grazed as the loss, as shown by this test, is quite serious.

PASTURE WORK

In the spring of 1941 some work was begun with pastures. In this test the land selected was a type that is considered unsafe for crop production due to lack of drainage, and the object was to determine if these lands could be made to produce some income, how much, and what combination of grasses and clovers were best suited to such lands. Six 6-acre blocks were fenced; four of these were broken and planted to various grasses and clovers; while block 5 was drained only; and block 6 left as found originally. The results to date are given below; gains being in pounds of beef per acre.

Lot No	Type Pasture	Gain per acre 1941*	Gain per acre 1942	Gain per acre 1943	Average per Year
1	Persian clover, Dallis grass, Rye grass	90.5	355	426	290.5
2	White Dutch clover, Bermuda grass, Rye grass	71.6	297	406	258.2
3	Red clover, Dallis grass, Rye grass	50.0	337	502	296.3
4	Alsyke clover, Dallis grass, Bermuda grass, Rye grass	72.5	352	297	240.5
5	Drained and clipped only	63.3	151	197	137.1
6	Check—no treatment	24.3	91	158	91.1

*Very light grazing for three months only.

As seen from the above table, it is possible to obtain a good revenue from these lands that heretofore have produced nothing, or very little in the best years. It is also shown that it pays well to break and plant such lands to good grasses and clover rather than wait for natural seed-

ing and sodding. Block number 5 is improving steadily each year but in the meantime losses are being taken, as compared to the improved lots 1, 2, 3, and 4.

SOYBEANS

Work with soybeans has consisted of (1) standard variety tests, (2) new varieties and strains, (3) edible varieties, (4) date of planting, and (5) methods of planting. For harvest as beans the best of the early varieties have been Ogden, Macoupin, and Arksoy 2913. For late maturing varieties the Nela (Mamloxi X Mammoth Yellow), Mamotan 6680, and Mamloxi have proven best. For hay, Avoyelles, Otootan, and Hybrid 303 have shown best.

Rice Experiment Station, Crowley . . .

J. Mitchell Jenkins, Superintendent

CULTURE

Holding Water on Uncropped Land

The 7-year average yields of rice grown on (a) land plowed in the fall and submerged until March 1, (b) on unplowed stubble land submerged from fall to fall, and (c) on unplowed land not submerged during the uncropped period were essentially the same. The average yield for treatment (a) was 26.3 bushels, for treatment (b) 24.9 bushels, and for treatment (c) 25.2 bushels per acre.

Fertilizer Experiments

The source of phosphorus, effect of straw, and the rate and method of application experiments were located on the Longenbaugh field, and the 13 fertilizer formulas were tested on original station land. The response of the rice crop to fertilization is better on the Longenbaugh field than on the "older" station land.

Sources of Phosphorus

In 1943, the application at seeding time of 400 pounds per acre of an 8-10-6 fertilizer, with T. V. A. treble superphosphate, T. V. A. fused phosphate, and bone meal as sources of phosphorus, gave increases in rice yields of 20.0, 19.8, and 18.8 bushels per acre, respectively.

The 6-year average (1937-1943 less 1940) yield of rice for T. V. A. treble superphosphate was 70.1 bushels, for T. V. A. fused phosphate 69.1 bushels, and for bone meal 68.2 bushels per acre. In the order listed, the increase in yields as compared to the check plots was 14.4, 13.4, and

12.5 bushels per acre. These results indicate that the three sources of phosphorus were about equally good.

Effect of Straw

In 1943, the average increase in the yield of rice, following the application of 3 tons of straw turned under in alternate years, was 13.7 bushels; whereas, the average increase, following the application of 3 tons of straw plus 400 pounds of an 8-10-6 fertilizer (half applied with the straw and the other half with the seed), was 25.5 bushels per acre.

The 5-year (1938-1943 less 1940) average increase in yield, following straw alone, was 4.5 bushels, and the 6-year (1937-1943 less 1940) average yield following straw plus fertilizer, was 16.6 bushels per acre. The 6-year average yield of the check plots was 50.1 bushels per acre.

In 1943, on land cropped *each* year, the average increase in the yield of rice following 3 tons of straw turned under was 7.4 bushels, and following 3 tons of straw plus 400 pounds of an 8-10-6 fertilizer (half applied with the straw and the remainder applied with the seed) was 14.9 bushels per acre.

The 5-year (1938-1943 less 1940) average increase in yield, following straw alone, was 5.0 bushels, and the 6-year (1937-1943 less 1940) average, following straw plus fertilizer, was 15.8 bushels per acre. The 6-year average yield of the check plots was 45.2 bushels per acre.

Rate and Method of Application

Four fertilizers, including 8-0-0, 0-10-0, 8-10-0, and 8-10-6, each were applied at the rate of 100, 200, and 300 pounds per acre on the water 8 weeks after submergence.

In 1943, for the 100-pound rate, the highest average yield of rice was 50.2 bushels from the 8-10-6 formula, for the 200-pound rate 57.7 bushels from the 8-10-0 formula, and for the 300-pound rate 54.9 bushels per acre from the 0-10-0 formula. The average increases in yield for these three fertilizers, at the rates applied and in the order listed were, 4.4, 7.5, and 3.8 bushels per acre. At each rate of application, the 8-10-6 fertilizer gave the highest 4-year (1939-1943 less 1940) average yields. The average increases for this formula, applied at the rate of 200 and 300 pounds per acre, were 3.5 and 3.3 bushels more per acre than for the 100-pound rate. In average yields, the 8-10-0 and 0-10-0 formulas ranked second and third.

In 1943, the application of 200 pounds per acre of 8-10-6 fertilizer with the seed and 200 pounds 8 weeks after submergence produced 14.1 bushels more per acre than when the total amount was applied with the seed. In the 4-year period (1939-1943 less 1940), the average increase in

yield for the split application was 6.9 bushels more per acre than when the total amount was applied with the seed. The average yield from the check plots during this period was 54.3 bushels per acre.

Thirteen fertilizers, in which the formulas ranged from 0 to 12 percent of nitrogen, 0-15 percent phosphate, and 0-9 percent potash, were applied with the seed at the rate of 200 pounds per acre. In 1943, the highest average yields were 37.3 bushels from the 8-0-0 formula, 34.6 bushels from the 8-0-6 formula, and 30.6 bushels per acre from the 12-10-6 formula. This is the first year that the 8-0-0 formula has given the highest yield, and during the 4-year period (1939-1943 less 1940), it ranked third. The highest 4-year (1939-1943 less 1940) average increases in yields were 8.4 bushels from the 8-10-6 formula, 7.5 bushels from the 12-10-6, 7.3 bushels from the 8-0-0, and 6.8 bushels per acre from the 4-10-6 formula.

ROTATION EXPERIMENTS

Two-Year

In 1943, the highest average rice yields were following native pasture, Barchet soybeans followed in the fall with bur clover, and Barchet soybeans, in the order listed. The crop or treatment that alternated with rice and the 9-year (1934-1943 less 1940) average rice yields were as follows: Italian ryegrass on rice stubble 48.5 bushels; red clover on rice stubble 48.1; soybeans and bur clover 47.2; clean summer fallow 47.0; Barchet soybeans 47.0; native pasture 46.0; *Crotalaria spectabalis* 45.5; and cotton dusted with calcium arsenate until 1941, replaced in 1942 by oats and Alyce clover 35.5 bushels per acre.

The 8-year (1935-1943 less 1940) average yield of rice following dusted cotton was 29.6 bushels, cotton not dusted with calcium arsenate to control the boll weevil 41.6 bushels, and following native pasture 37.2 bushels per acre. Since 1941, dusted cotton has not been grown in this rotation, but the length of the residual effect of calcium arsenate on rice yields is to be determined by growing rice in alternate years on the plots previously dusted.

Ten-Year

In this rotation, 5 consecutive rice crops are grown following 5 consecutive years in cotton, in corn and soybeans, and in native pastures supplemented with clovers. Five consecutive rice crops have been grown, but the yields in 1940 were not recorded, because of damage by floods. In 1943, the highest average yield of rice was 42.4 bushels per acre, following 5 consecutive years in corn and soybeans, with a slightly lower yield following 5 years in pasture. The yield following 5 years in cotton was 28.4 bushels per acre. The 4-year (1939-1943 less 1940) average yield

was 48.7 bushels per acre, following pasture supplemented with clovers, 47.1 bushels following native pasture, 45.6 bushels following corn and soybeans, and 32.1 bushels per acre following cotton.

PERMANENT PASTURE EXPERIMENT

The highest 10-year (1933-1943 less 1940) average yield of cured hay was 3.05 tons per acre, from plots that were seeded, fertilized and limed. Taking an average of all plots for the 10-year period, the greatest increase in yield per acre of cured hay was from plots that received both fertilizer and lime. Fertilizer applied alone gave a slightly higher yield than lime alone. There was practically no difference in the 10-year average yields of the two plots of native growth, one fertilized and the soil re-prepared the fifth year, and the other fertilized but the soil not re-prepared. The vegetation on the latter consisted of a rather uniform mixture of carpet grass and common lespedeza during the entire period of 11 years.

OATS

Varieties

In the fall of 1942, four oat varieties (including Alber, Camellia, Louisiana No. 517, and Ventura) were sown in replicated field plots. The average yields of Alber, Camellia and Louisiana No. 517, were essentially the same, and over 55.0 bushels per acre. Ventura was grown in only 3 series, and the average yield was somewhat lower.

Fertilizer Experiment

In the fertilizer experiment, the highest average yield of oats was 61.7 bushels per acre, from the plots that received only a top-dressing of 150 pounds of nitrate of soda, or 26.3 bushels more than the check. The yields from the plots that received a complete fertilizer at seeding time and a top-dressing of 100 pounds of nitrate of soda, and those that received 200 pounds of a 4-10-7 fertilizer as a top-dressing ranked second and third, respectively. The lowest yield was 40.1 bushels per acre from plots that received fertilizer only at seeding time, or 4.7 bushels above the check.

Rice Breeding and Improvement . . . N. E. Jodon

Varieties Released Prior to 1940

Three varieties previously released by the Rice Experiment Station, Fortuna, Nira, and Rexoro, are well established. Data from the "Estimate of the Rice Crop for the Year 1943," compiled by the Rice Millers' Association, New Orleans, La., show that 37.8 percent of the rice pro-

duced in Louisiana and Texas was of these three varieties. The following gives the percentage production of each of the six principal varieties grown in these two States in 1943:

Early Prolific	17.8 percent
Zenith	6.4 "
Fortuna	5.3 "
Nira	2.5 "
Blue Rose	35.8 "
Rexoro	30.0 "
Total production of varieties	97.8 percent
Total production of Fortuna, Nira and Rexoro	37.8 "

New Varieties Provisionally Released

Three new varieties developed in the cooperative breeding program and grown on a limited acreage in 1942 were given further trial by farmers in Louisiana in 1943. These included: (1) An early-maturing medium-grain variety developed at Beaumont, Texas, from the cross Colusa x Blue Rose (C. I. 8323). This variety is somewhat less susceptible to Cercospora leaf spot, usually matures a few days earlier, and yields more than Early Prolific. It is recommended for light soil, the straw being rather weak when grown on ordinary rice land. (2) An early non-shattering long-grain variety of good culinary quality which was selected at Crowley, La., from the cross Edith x Fortuna (C. I. 8319). Although not a high yielder when grown on average soil, it may have some possibilities for heavier land. (3) Blue Rose 41 (C. I. 8317), a Cercospora leaf spot and white-tip resistant selection made at Crowley, La., from Blue Rose, is similar to Improved Blue Rose in plant and grain type but remains green until harvest, in contrast to other Blue Rose varieties, the straw of which deteriorates and often causes the crop to lodge before full maturity.

Four other new varieties, all derived from crosses, were grown by farmers in Louisiana for the first time in 1943. These included: (1) A selection made at Crowley, La., from the cross Improved Blue Rose x Fortuna (C. I. 8318), which matures with and apparently yields and mills as well as or better than Early Prolific. The grain is clear and very similar to Blue Rose. (2) Bluebonnet, C. I. 8322, a long-grain selection made at Beaumont, Texas, from the cross Rexoro x Fortuna, which matures four or five days earlier than Fortuna. It has Rexoro grain type, short, stiff straw and threshes easily. (3) Kamrose, C. I. 8314, a selection made at Stuttgart, Ark., from the cross Kameji x Blue Rose, which matures at about the same time as Fortuna and is high yielding, but the straw is rather weak and it is difficult to thresh. The grain is somewhat shorter than Blue Rose. (4) Texas Patna, C. I. 8321, a selection made at Beaumont, Texas, from the cross Rexoro x C. I. 5094, which matures a week or ten days earlier than Rexoro, is similar in grain type and quality, but taller.

The above varieties were grown in Louisiana by thirteen farmers from seed furnished by the Rice Experiment Station. Other varieties were increased in small amounts for possible provisional release in 1944. Repurification of nine standard and promising varieties, by growing and inspecting a total of about 1200 rows, each row from a single panicle (head), was carried on to provide foundation seed.

Field Yields of Rice Varieties

Yields of standard and more promising new rice varieties given here are averages of field plot and nursery tests conducted from 1941 to 1943, inclusive. Six experiments were averaged in the early group, five in the mid-season group, and eight in the late group. The varieties within each group are listed in order of maturity, so far as possible.

Cross or Variety	C. I. No.	Bu. per acre
Early		
Colusa x Blue Rose	8323	36.9
Early Prolific	5883	32.1
Improved Blue Rose x Fortuna	8318	35.4
Zenith	7787	35.3
Edith x Fortuna	8319	26.7
Shoemed	3625	35.5
Prelude	8311	37.4
Midseason		
Bluebonnet	8322	39.3
Kamrose	8314	47.4
Fortuna	1344	37.7
Nira	2702	40.7
Iola x Blue Rose No AL 5-30	....	42.7
Improved Blue Rose	....	40.0
Blue Rose 41	8317	43.2
Late		
Texas Patna	8321	39.3
Delrex (Rexoro x Delitus)	8320	39.4
Rexoro	1779	37.7

Preliminary Steps in Production of New Varieties

To provide varieties which may more adequately meet the growers' requirements, or be better adapted to new conditions, a number of crosses are made each year. True breeding selections of various maturities and grain types are chosen for plant type, disease resistance, and quality from rows grown from single plant selections. These are tested for yield in small nursery plots, and also for milling and cooking quality. It is desirable to have nursery tests in various locations in the rice-growing area, and three outfield nurseries were seeded in 1943. The outstanding selections from nursery tests are placed in field plots and, if satisfactory, may be provisionally released. A period of 12 to 15 years or more may be required to produce and test a new rice variety by crossing.

Clearing of stumps from cut-over lands in Washington Parish, Louisiana where Southeast Louisiana Livestock Experiment Station is being established.

U.S. Department of Agriculture Progress Reports

Bureau of Entomology and Plant Quarantine

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Cole-Crop Insects . . . C. E. Smith

Because of wartime conditions, the supplies of certain essential insecticidal materials used extensively in controlling cole-crop insects have become critically scarce. Consequently, during 1943 particular emphasis was placed on research to develop substitutes for these scarce materials and to determine the possibility of reducing the recommended dosages and the amounts necessary by the use of adjuvants. Also special emphasis was placed on the development of inexpensive insecticides for use in home and victory gardens.

Cabbage Caterpillar Control Studies Impelled by Wartime Conditions . . . C. E. Smith and P. K. Harrison

The supplies of rotenone and pyrethrum, which in previous studies were found to be effective insecticides against the principal species of cabbage caterpillars—the cabbage looper, the imported cabbage worm, and the larva of the diamondback moth—and which could be used with safety on advanced stages and maturing crops, became extremely scarce by 1942. Furthermore, the supplies available were largely commandeered by the armed services. Therefore, the studies made during 1943 were devoted mostly to substitutes, reduced dosages and adjuvants for rotenone and pyrethrum, better utilization of arsenicals and cryolite, and control of insects by the destruction of crop remnants.

In the study of substitutes one chemical—DDT (dichloro-diphenyl-trichloroethane)—which gave outstandingly promising results, was tested. The data obtained indicate that this chemical is superior to either rotenone or pyrethrum as an insecticide for use against cabbage caterpillars. It was found to be highly toxic to all the species present on fall cabbage and its effects were long lasting. Cabbage receiving applications of a 10-percent DDT dust remained practically free of insects 35 days and longer after the applications. Young worms hatching from eggs laid on dusted leaves 3 weeks after the application died without feeding.

Observations and the results of the field experiments and laboratory tests indicated that DDT is also toxic to the banded and spotted cucumber beetles, the vegetable weevil, and several species of plant bugs, including the squash bugs, the harlequin bug, and the southern green stinkbug. Further work is required to establish the field of usefulness of DDT and to determine whether it is safe to use from the standpoint of human health. At present DDT is not available for civilian use.

None of the other materials tested were equal to either rotenone or pyrethrum as insecticides for control of cabbage caterpillars; however, several showed some promise against one or another of the species. These included yam-bean flour (20%), which was moderately effective against the imported cabbage worm; nicotine (3% of a fixed form) tended to reduce the population of larvae of the diamondback moth; and a soap-water spray (1 pound of laundry soap to 5 gallons of water) killed the young cabbage loopers. Two other materials, Scorodite (a natural iron arsenate) and tartar emetic, showed promise on fall cabbage infested largely with the cabbage looper, but were inferior to rotenone and pyrethrum. Oil sprays killed some of the worms on both spring and fall crops, but were unsatisfactory. A 10-percent 2-chlorofluorene dust was practically ineffective, and *Derris malaccensis* showed indications of value, but the 4% dust mixture used was too dilute to give a satisfactory control.

In the study of reduced dosage and adjuvants for rotenone and pyrethrum, the results showed that dusts containing at least 0.2 percent of pyrethrins, made either of the powdered flowers or impregnated concentrates, are required to control cabbage caterpillars satisfactorily on both spring and fall crops under Louisiana conditions. Also the results showed that 0.5-percent rotenone dust will control the caterpiller population on spring crops fairly satisfactorily but is inadequate for fall-crop populations. Nicotine, especially the fixed form, when added to pyrethrum dust tended to increase its effectiveness, whereas sulfur did not. A light mineral oil (2%) and Lethane-60 (3%) tended to increase the effectiveness of weak dilutions of rotenone, the oil being slightly the better of the two; whereas sulfur and fermate (ferric dimethyl-dithiocarbamate) had no visible beneficial effect on rotenone dusts.

The results of the study on utilizing arsenicals and cryolite in controlling cabbage caterpillars corroborated those of earlier studies, namely, that it is unsafe to apply poisonous residue-forming insecticides on cabbage after the plants start heading when the crop is to be marketed as U. S. Grade No. 1 (the heads containing four loose, or wrapper, leaves). The data obtained in the plant-growth phase showed that less than 0.3 of 1 percent of all the leaves on the harvested cabbage were exposed at the time when the plants were just starting to head. Therefore, it might be concluded that when poisonous insecticides are applied on cabbage after the heads start forming, the heads will have to be stripped to contain less than four loose leaves, the number depending on how near to harvesttime the applications are made.

The results of two experiments on controlling cabbage caterpillars by destroying crop remnants showed that there was considerable difference in the effectiveness of the various operations employed. It was shown that discing and other mechanical multilation operations of the old plants before bedding were considerably better than none. In bedding, the turning plow tended to be better than the middle-buster when not followed with a cultivator disc, whereas the middle-buster was better than the turning plow when followed by the cultivator disc. Observations indicated that the thorough destruction of the remnants of fall and winter cole crops that are to be followed by similar crops grown in the spring is well worth while. However, in the case of spring cole crops, which are usually followed by other kinds of crops, no special attention need be given, because very few cole-crop plants are left to which the insects can transfer.

Nicotine Can Be Substituted for Rotenone in Controlling the Turnip Aphid . . . C. E. Smith and P. K. Harrison

Rotenone has been proved by experimentation and practical use to be an effective insecticide for controlling the turnip aphid, as well as several leaf-eating species that sometimes seriously damage turnips and related crops in the South. Because of the serious shortage of this material for use on these important food crops, investigations were made during 1943 to develop a satisfactory substitute that could be used by both the home and the victory gardener and also by the commercial grower.

The results of these investigations showed that nicotine is an effective insecticide against this pest; however, its effectiveness varied considerably between the different forms. The effectiveness of the different forms of nicotine were in the following order: Free, sulfate, and fixed. The data and observations showed that the fixed form of nicotine was unsatisfactory under the conditions prevailing when it was used, such as low temperatures. Of the other materials used, the indications were that DDT and the thiocyanates are relatively ineffective against this pest; however, the results may have been influenced by the relatively low temperatures prevailing during the periods of the experiments. Soap-and-oil sprays killed considerable numbers of the aphids but stunted the plants to a damaging extent. Pyrethrum had some insecticidal value, but was inferior to the better nicotine preparations. Sulfur used alone appeared to have no insecticidal value against this insect.

Bee Culture Investigations

The Southern States Bee Culture Laboratory, a field station of the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture, was establish-

ed cooperatively with the Louisiana State University in 1928 and is concerned with beekeeping problems common to the Southern States. Current projects include production of package bees and queens, honey production, nectar secretion, pollination, and breeding and race improvement of bees.

Package-bee Production . . . Warren Whitcomb, Jr.

Owing to the need for bees, not only for honey and wax production but also to insure pollination of important seed crops, the demand for package bees and queens has increased greatly since the beginning of the War. Because of labor and travel restrictions, it has become increasingly important to obtain the maximum production of bees per colony. The average production of package bees per colony in Louisiana is about 5 pounds. Studies at Baton Rouge show that a properly managed colony should produce 20-24 pounds of bees, and a maximum yield of 36 pounds has been attained.

It now appears that, in addition to a good queen, young bees, and suitable equipment, a colony in November should have from 60 to 100 pounds of honey stores and at least 1,000 square inches of pollen to satisfy its needs during the winter. These requirements are considerably in excess of what is normally provided. Colonies manipulated for package-bee production must begin brood rearing early in January, and this brood rearing must be maintained at a high level if maximum strength is to be attained by the time the shipping season begins. Experiments indicate that colonies should be stimulated to initiate brood production and that they must have reserves of honey and pollen to maintain brood rearing.

It has been found that the mechanical operation of opening and examining colonies early in January often stimulates egg laying and brood production. Studies are now in progress to determine the best time and the best methods of colony stimulation. There is some evidence that spraying the frames lightly with sugar sirup may afford as effective stimulation as feeding large quantities of sirup. At the time the colonies are first examined and sprayed they are also given pollen cakes,[1] which are placed directly above the brood nest. Additional cakes are given as necessary until settled warm weather arrives. It apparently is not generally recognized that pollen shortages during periods of cold or rainy weather may greatly reduce brood production. The presence of pollen cakes is insurance against pollen shortages, and leaving from 60 to 100 pounds of honey on the colony in the fall will provide adequate honey stores for the early-spring period.

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1 For methods of making and feeding pollen cake see Cir. E-531, "The Use of Pollen Traps and Pollen Supplements," available from the Southern States Bee Culture Laboratory, University Station, Baton Rouge 3, La.

Methods used in shaking package bees during the shipping season also influence the production of the colony. Maximum production is reached in experimental colonies when 4 pounds of bees are removed every 10 days. It now seems evident that the greatest production of bees is attained when the colony population is maintained at a level of 4-5 pounds of bees during the shipping season. This level seems to insure maximum brood production, although data obtained thus far are not conclusive. Variation in colony population, such as would be caused by alternate heavy and light shaking or by irregular intervals between shakings, decreases brood production and yield of bees. On the basis of present knowledge, recommendations for colony management for package-bee production are briefly as follows:

1. Requeen colonies so that the colony contains a young laying queen and young bees in the fall.
2. Leave 60-100 pounds of honey for each colony in November.
3. Have four or more frames of pollen placed beside, or above, the brood nest.
4. Winter in 3-deep bodies in a protected location.
5. Examine colonies early in January, feed or spray lightly with sugar sirup, and put a pollen cake directly above the brood nest.
6. Renew pollen cake as necessary.
7. At the beginning of the shipping season shake regularly, and heavily enough to maintain a population level of 4-5 pounds of bees.

White Clover Seed and Honeybees . . . Everett Oertel

Louisiana is the leading State in the production of white clover, *Trifolium repens,* seed, but the yields per acre are conspicuously low in comparison with some of the other States in which white clover seed is produced. This comparison is shown in Table 1.

TABLE 1. Production of White Clover Seed and Yield per Acre in Five States, 1937-43[1]

State	Thousand acres harvested			Yield per acre (pounds)		
	1937-41	1942	1943	1937-41	1942	1943
Louisiana	7.82	11.4	10.3	38	45	50
Mississippi	1.05	4.0	3.8	106	55	65
Wisconsin	1.84	1.3	2.6	102	170	195
Idaho	.93	2.8	2.2	306	250	275
Oregon	.68	2.0	2.0	89	120	100

[1]Miscellaneous grass and clover seed, crops-average, yield and production, 1942, 1943, and averages: U. S. Bur. Agri. Econ. (Processed), February 3, 1944.

The amount of white clover seed produced in Louisiana probably can be increased at small cost by the use of honeybees as pollinating agents. White clover is self-sterile, consequently many insects must be available to cross pollinate the blossoms if a profitable set of seed is to be obtained. Table 2 gives the amount of seed set under cages covered with wire of different mesh. Each cage was 3 feet on a side. The check cages were covered with chicken wire to prevent animals from grazing the clover plants. Honeybees could not get through the 6- or 60-mesh screen, but this would not exclude smaller insects.

TABLE 2. Number of Seeds Produced by White Clover under Cages Covered with Wire of Various Mesh Openings at Three Locations in Louisiana

Location	60-mesh Cages		6-mesh Cages		Chicken-wire Cages	
	A	B	A	B	A	B
Patterson.....	0	....	12	....*	1,845	.....*
Baton Rouge.....	5†	....	240	102	8,580	12,000
Baton Rouge.....	0	....	895	5,350	9,690	35,050

*Cages removed by farm laborers.
†Seeds small and shriveled.

Some seeds were set under the 6-mesh cages, showing that insects smaller than honeybees pollinated a few blossoms. At each location the largest amount of seed was obtained from the check cages. Although honeybees were the most frequent pollinating visitors observed on the blossoms of the check cages, a few cucumber beetles, grasshoppers, and thrips were also seen.

It is recommended that clover-seed producers induce beekeepers to locate apiaries close to the clover fields. In this manner the insect population in the area can be greatly increased. One or two hives of bees per acre of clover should materially improve pollination. Dairymen interested in the perpetuation of white clover in pastures might find it advisable to maintain a few colonies of bees on the farm.

Breeding and Race Improvement . . . Otto Mackensen

The control of mating is still one of the chief problems in race improvement. During the past season mating stations established in the cut-over pine lands within 70 miles of Baton Rouge, in Tangipahoa and St. Tammany Parishes, were found to be inadequately isolated. When queens and drones of an inbred yellow strain were placed at the three established locations late in April, low percentages of pure matings were obtained—59, 59, and 33 percent, respectively. Mismatings with the dark native drones were easily recognized by the darker progeny produced.

The percentage of pure matings was probably a little higher in the regular breeding stock mated earlier, when fewer native drones were abroad. Nevertheless the number of mismatings was still far too great to make a breeding and selection program practical, and more isolated locations must be found. The coastal marshes of Louisiana have now been investigated in this connection and it is believed that a number of sufficiently isolated locations can be found there.

Instrumental insemination of queen bees has been so perfected that it is now being used for race improvement studies under field conditions. Both disease resistant and honey producing strains are now perpetuated by this method.

The technique of mating by artificial insemination is becoming more and more practical and this method may eventually make it unnecessary to seek isolated locations. Queens of disease-resistant stock inseminated here and tested at the Intermountain States Bee Culture Laboratory, Laramie, Wyo., performed satisfactorily in egglaying and became the heads of colonies that compared favorably with others headed by naturally mated queens of the same stock. Other artificially inseminated queens of a high-producing stock tested at the North Central States Bee Culture Laboratory, Madison, Wis., also made a very good showing when compared with sister queens mated naturally. One of the obstacles in artificial insemination has been a delay of at least 15 days in initial egg laying, which causes the loss of a large percentage of the queens and a weakening of those that remain. It now appears that this difficulty can be overcome by administering large quantities of semen. A number of queens treated in this way began laying within 15 to 23 days after emerg-

ence, whereas from 30 to 50 days is usually required. By first inseminating a group of queens artificially and then letting them mate naturally, it was shown that injury during the insemination process is not the cause for delayed egg laying. These queens started to lay about as quickly as naturally mated queens.

The number of sperm cells in the seminal vesicles of drones and in the spermathecae of naturally mated queens was determined with the aid of a haemocytometer. The average number found in queens was 5,727,000 with a maximum of 7,350,000. The average number (5,005,000) in a group of artificially inseminated queens compares very well with these figures. Drones were found to contain from 132,000 sperm cells on the third day after emergence to 9,897,000 on the seventh day. By the fifth day they contained enough sperm cells to be used satisfactorily in artificial insemination. These drones were maintained in cages after emergence and it is probably for this reason that the average on the seventh day did not reach the average of 10,405,000 found in a group of drones taken as they returned from flight.

Two mutant types of bees are available for genetic studies, one of which carries the cordovan character, which apparently changes the black pigment of the bee body to brown; the other carrying the white character, which causes a complete lack of pigment in the eyes. Both of these characters have been found to be simple recessives. Experiments during the season have shown the genes transmitting these two characters to be nonlinked, that is, not located on the same chromosome. Indiviuals possessing the cordovan character were found to be 95 percent as viable, but not quite so vigorous, as normal individuals. Genetic characters like these will facilitate the attack on many nongenetic, as well as genetic, problems.

Corn Breeding

Hugo Stoneberg

Corn breeding in Louisiana is conducted by the Division of Cereal Crops and Diseases, Agricultural Rsearch Administration, U. S. Department of Agriculture, in cooperation with the Louisiana Agricultural Experiment Station.

Inbred lines are isolated from the better open-pollinated varieties grown in Louisiana by several generations of controlled inbreeding. Many lines must be isolated because only one or two percent of them turn out to be outstanding in performance when they are tested in crosses. These few superior Louisiana inbred lines are the parents of the double crosses developed for the State. Seed of these hybrids now is being produced in commercial quantities in isolated production fields. Although good hybrids are now in production, the study and testing of

new breeding materials is in progress in order to determine better hybrids than those now available.

Tests of Corn Varieties and Hybrids—1943

Four successful uniform tests of corn varieties and hybrids were conducted in the state in 1943. In each of the four tests, the hybrids produced substantial increases in yield over the open-pollinated varieties. The increase of 7 Louisiana commercial hybrids over the open-pollinated varieties was 3.8 bushels or 9.8 percent at Baton Rouge, 8.3 bushels or 22.6 percent at St. Joseph, 13.6 bushels or 32.4 percent at Calhoun, and 3.8 bushels or 21.7 percent at Simsboro. The average increase was 7.4 bushels or 21.4 percent. This is in agreement with results obtained in past years.

Louisiana hybrids are definitely superior to the local varieties in yielding ability and quality of grain and an average increase of about 20 to 25 percent can be expected by using hybrid seed. More interest is being manifested in hybrid corn as the merits of locally adapted hybrid corn become better known. Since good hybrids suited to the various areas of the state have been developed, it is planned to make hybrid seed available to the farmers in increasing quantities. Three thousand bushels of hybrid seed were produced by several growers in 1943. This seed is now available for planting and it will mean that Louisiana hybrid corn will be grown on about 24,000 acres in 1944. With an average increase of 7 bushels per acre, the total increase should amount to 168,000 bushels. It is planned to triple the hybrid seed production in 1944 and in the near future the increased use of hybrid seed should increase the total corn production considerably.

Cotton Disease Investigations—1943

D. C. Neal

Seed Treatment for Stand Improvement

This project was begun as a local test in 1936, and, in 1938, enlarged into a regional test for the states of the main cotton belt. It is concerned with tests of various chemical dust treatments and methods of delinting for controlling seedling diseases and preventing stand deterioration. The results of these Louisiana experiments, 1937-1942, have already been published in the biennial report of the Northeast Louisiana Experiment Station for 1941-42, and the combined regional data from other states also are now assembled for publication.

During the season 1943 six chemicals were studied at three dosage rates, namely, normal dosage or $1\frac{1}{2}$ ounces per bushel (the standard rate for Improved Ceresan), one-half normal and one-quarter normal. In addition to Improved Ceresan two chemicals, DuBay-1452C and Spergonex,

were outstanding and equally effective in increasing emergence and preventing deterioration by seedling disease attack. Also, the smaller dosage, one-half normal, for these materials was as good as the heretofore-recognized normal dosage of $1\frac{1}{2}$ ounces per bushel of seed. All gave highly significant increases over untreated seed.

Breeding For Wilt Resistance

Breeding for wilt resistance by testing, roguing, and selection was continued the past year in the field and greenhouse. Progenies of several selections of wilt-resistant hybrid, D. & P. L. 829 x Dixie Triumph 62-75, now show a high degree of resistance and many also possess better fiber, especially longer staple, higher lint percent, fineness, and other desirable fiber properties. Moreover, after three years of testing, these lines now appear ready for increase and ultimate utilization in certain wilt infested areas. Increase blocks, restricted to progenies with a staple length range of 36 to 40 thirty-second inches and a lint range of 36 to 40 percent, will be planted in 1944. This hybrid is early and productive and no doubt will be suitable for the hill and Coastal Plain sections of the State where the wilt disease is of economic importance.

Long Staple Cotton Wilt Studies: Potash-Variety Tests

Studies of resistance and susceptibility of eight staple cottons and one of intermediate length and the effect of potash on the prevalence of the disease were made the past season in the Delta at Osceola, Louisiana. Two levels of potash, 4 and 8 percent, supplied from 4-8-4 and 4-8-8 (N.P.K.) fertilizer, were employed. The rate of application of the fertilizer was 600 pounds per acre, and each potash level, together with a 4-8-0 (check), was replicated three times in nine randomized blocks. The data show that the addition of potash to the fertilizer as well as the higher level had no effect in decreasing wilt infection or increasing yields. These results are in direct contrast to those obtained from other sections of the State, and seem to indicate that some of the wilt-infested soil tracts of the Delta are not deficient in potash at the present time.

The Osceola test also showed that of the nine varieties included only three were resistant. Listed in order of highest resistance, they were Delfos 425-920, Coker 100 W.R., and Delfos 425. Of the good staple cottons Coker 100 W.R. and Delfos 425-920 produced highest yields, being followed by Deltapine 14, an intermediate variety.

Rhizoctonia Leaf Spot

Rhizoctonia leaf spot, apparently due to the common soil fungus, *R. solani,* was found attacking leaves of mature cotton plants at the Station farm in July. Cultures were obtained and the disease reproduced by inoculation experiments. This disease is being further investigated, with

special attention given to mode of dissemination, over-wintering, varietal resistance, and economic importance.

Physiological Wilt

During the past season the cotton crop in many of the Delta parishes was seriously damaged by "physiological wilt," a trouble induced by prolonged dry weather, high temperatures, and accumulative unfavorable soil conditions. Soil profile examinations and investigations of previous cultural practices revealed that the organic content of these soils is usually low and that cotton plants grown therein are unable to obtain adequate moisture and nutrients for normal metabolism during these severe stress periods. The answer to the problem appears to be improved rotation and cultural practices so that abundant organic matter may be supplied quickly and thereby enhance the water-holding capacity of these soils.

Cotton Investigations

John R. Cotton

Hopi, a very fine but very short staple variety grown by the Hopi Indians of Arizona since prehistoric times, was crossed with several of the better adapted upland varieties. Several of the resulting progenies have shown considerable merit, the best selections having a length of $1\frac{1}{8}$ inches or better, and a lint percentage of 37.5%.

Hopi upland crosses were tested last year in comparison with some of the better strains of commercially grown cottons and yields were fairly promising; however, the Hopi crosses produced rather small bolls. The selections last year were made with the intention of correcting this fault. It is believed that this may be corrected without seriously affecting the qualities. The better progenies of these crosses will be increased for further testing.

Selection and wilt resistance testing of the D. & P.L.-Dixie Triumph cross has reached the stage where the better progenies are to be increased and tested in variety tests. If these progenies continue to show as much promise as in the past, they will be given to the growers as soon as they can be increased sufficiently.

Several other projects were conducted and progress on these reported in the 1943 report. Some of these projects are to be curtailed in order to give more attention to projects which are more in line with the war effort. Projects which have been temporarily discontinued are Sea Island breeding, breeding for rough fibered cotton and Sea Island variety tests.

A new project on flame cultivation is being started this year. This project will attempt to eliminate hoeing and cultivating to a greater or lesser degree, depending on its success. This will be conducted in cooperation with the Department of Agricultural Engineering.

Financial Statement—Agricultural Research Funds
July 1, 1942 to July 1, 1943

Federal Research Funds

	Hatch	Adams	Purnell	Bankhead-Jones
Appropriations	$15,000.00	$15,000.00	$60,000.00	$56,502.80

Expenditures—Federal Funds

Salaries and wages	$12,622.55	$13,195.21	$49,309.46	$46,808.12
Supplies and expense	1,644.68	1,011.40	5,819.17	5,966.35
Travel	332.77	289.55	2,753.19	2,473.51
Capital Outlay	400.00	503.84	2,118.18	1,254.82
TOTAL	$15,000.00	$15,000.00	$60,000.00	$56,502.80

Expenditures—State Funds

	Bankhead-Jones Offset	State Non-Offset	Other* State Funds	Research Fellowships
Salaries	$37,644.66	$28,627.39	$ 50,092.10	$13,292.21
Wages	7,222.30	2,101.35	25,478.63	6,194.35
Supplies and Expense	12,904.34	3,588.43	34,785.44	6,227.83
Travel	2,537.78	1,000.67	6,142.01	2,301.82
Capital Outlay	487.26	2,752.61	13,347.41	3,512.40
TOTAL	$60,796.34	$38,070.45	$129,845.59	$31,528.61

*Includes appropriations for sub-stations and special Legislative appropriations.